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The *Rhagovelia* of the Western Hemisphere, with Notes on World Distribution (Hemiptera, Veliidæ).*

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INTRODUCTION.

THE broad-shouldered water-striders is the common name given to the insects belonging to the genus *Rhagovelia*. This is a group of small aquatic Hemiptera which spend their lives on the surface of our fresh-water streams. Due to their small size and their habitat, few collectors take them, or even see them. Often these striders are mistaken for their larger relatives, the gerrids, as the two are frequently found skating together on rapid-moving streams.

The genus *Rhagovelia* may be easily distinguished by five characters: the 4-segmented antennæ, the 3-segmented beak, the 3-segmented tarsi, the basal antennal segment longest, and the third tarsal segment of the intermediate leg split three-fourths of its length and with feathery hairs in this cleft. The individuals vary in size from 2.5 mm. to 8.5 mm. and in color from yellowish-brown to black.

The habitat of these small bugs is rapid-moving streams, with the exception of three species which live on the salt water of bays. They are gregarious: groups may be found in the eddies of streams, where they are presumably awaiting the arrival of food which the current brings them. Although the *Rhagovelia* are predators, they usually will not attack another of their kind, nor will they molest the larger gerrids that are often found in the same pool. They are

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excellent divers and can swim readily below the surface of the water. Bueno (1907) says, "Mating takes place in June or July, when the schools are made up largely of sexes *in copula*."

Both winged and wingless forms are found together, the wingless forms being more common. That the winged forms are good flyers is shown by the fact that Doctor Beamer in 1927 collected two specimens from a water tank in Arizona forty miles from any running water. Usually the number of males and females found in a school is about equal.

HISTORICAL.

The genus *Rhagovelia* was erected in 1865 by Mayr for three species described by Burmeister in 1835 in the genus *Velia*. Uhler was the first to describe a species from the United States, describing the well-known form *obesa*, in 1871. In 1879 F. B. White erected the genus *Neovelina* for the species *trilii*, which later proved to be a *Rhagovelia*. In 1894 Uhler added two more species and in 1898 Breddin described *Neovelina whitei*, which was later assigned to *Rhagovelia*.

Then in 1898 Champion more than doubled the number of the then known species by his addition of nine new species from Central America. About the same time Kirkaldy described two species and in 1900 published a check list of the nineteen species known from the Western Hemisphere. Since then several writers have added to our knowledge of the group, three of the more recent writers being Bueno and Drake & Harris, who described three species and six species respectively.

DISTRIBUTION.

Specimens of *Rhagovelia* are not common in our museums. Due to their small size, their color, and their habitat, only the specialists on aquatic and semiaquatic Hemiptera have made any appreciable collections of them. The insects are probably widely distributed throughout this country, South America, Central America, and the West Indies.

Rhagovelia seem to be typically a Western Hemisphere group, as forty-five species of a total of fifty-one are from this half of the world. None has been reported from Europe. Some day, perhaps, there may be collectors in the Eastern Hemisphere that will prove that part of the world equally important as a home of the *Rhagovelia*.

Records of all species as far as known are given in this paper for the sake of completeness. Included here are fifty-one species and eight varieties. Of this number thirteen species and eight varieties are described as new to science. One species, *R. reitteri* Reuter from Addah, is omitted, this making a total of fifty-two known species in the world.

DISTRIBUTION OF THE WORLD SPECIES.

	Africa.	Asia.	Aus- tralia.	East Indies.	West Indies.	Central America.	South America.	North America.
<i>ancipes</i> Hag				×				
<i>amazonensis</i> n. sp.							×	
<i>angustipes</i> Uhler					×	×	×	×
<i>arctoa</i> Bueno								×
<i>armata</i> (Burm.)								×
<i>australica</i> Kirk			×					
<i>bakeri</i> Bergroth						×		
<i>beameri</i> n. sp.								×
<i>calopa</i> D. & H.						×		
<i>castanea</i> n. sp.							×	
<i>chorcutus</i> Hussey								×
<i>collaris</i> (Burm.)					×			
var. <i>planipes</i> n.						×	×	
var. <i>pulchra</i> n.					×			
<i>confusa</i> n. sp.							×	
<i>crassipes</i> Champ						×		
<i>distincta</i> Champ								×
new varieties:								
<i>arizonensis</i> n. var.								×
<i>cadyi</i> n. var.								×
<i>harmonia</i> n. var.								×
<i>proxima</i> n. var.								×
<i>modesta</i> n. var.								×
<i>valentina</i> n. var.								×
<i>elegans</i> Uhler					×			
<i>femoralis</i> Champ.						×		
<i>festae</i> Kirkaldy							×	
<i>flavicincta</i> Bueno							×	×
<i>gigantea</i> Gould							×	
<i>gregalis</i> D. & H.						×		
<i>hirtipes</i> D. & H.						×		
<i>insularis</i> Champion					×	×	×	
<i>knighti</i> D. & H.								×
<i>longipes</i> n. sp.							×	
<i>lucida</i> n. sp.							×	
<i>maculata</i> Distant	×							
<i>nigricans</i> (Burm.)	×	×						
<i>obesa</i> Uhler								×
<i>obscura</i> n. sp.							×	
<i>oriander</i> Parshley								×
<i>peggie</i> Kirkaldy				×				
<i>plumbea</i> Uhler					×			×
<i>ravana</i> Kirkaldy		×						
<i>regalis</i> D. & H.						×		
<i>relicta</i> n. sp.							×	
<i>rivale</i> Bueno								×
<i>robusta</i> n. sp.							×	
<i>salina</i> Champion					×	×		
<i>sinuata</i> n. sp.							×	
<i>spinigera</i> Champ						×		
<i>spinosa</i> n. sp.							×	
<i>tarloriella</i> Kirk					×			
<i>tenuipes</i> Champ								×
<i>trilithi</i> (White)							×	
<i>trista</i> n. sp.							×	
<i>uncinata</i> Champion						×		
<i>varipes</i> Champion								×
<i>virida</i> (White)						×		
<i>whitei</i> (Breddin)							×	
<i>williamsi</i> n. sp.							×	
Totals: Species	2	2	1	2	7	13	18	14
Varieties					1	1	1	6

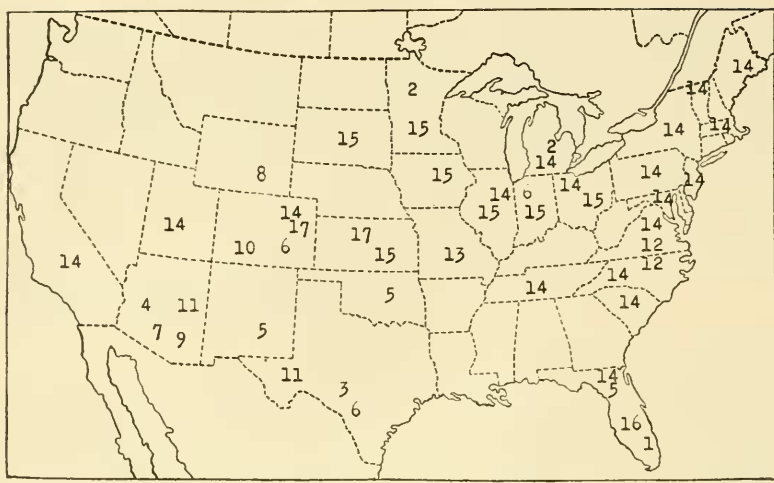


FIG. 1.—Distribution of species of *Rhagovelia* by States in the United States.

Numbers refer to species: 1, *angustipes* Uhler. 2, *arctoa* Bueno. 3, *armata* (Burm.). 4, *beameri* n. sp. 5, *choreutes* Hussey. 6, *distincta* Champ. 7, *d. var. arizonensis* n. var. 8, *d. var. cadyi* n. var. 9, *d. var. harmonia* n. var. 10, *d. var. proxima* n. var. 11, *d. var. valentina* n. var. 12, *flavicincta* Bueno. 13, *knighti* D. & H. 14, *obesa* Uhler. 15, *oriander* Parsh. 16, *plumbea* Uhler. 17, *rivale* Bueno.

CLASSIFICATION.

FAMILY VELIIDÆ Am. & Serv. 1843.

(After Hungerford.)

“Family Characteristics. Surface dwellers which are usually plump bodied, and broadest at the shoulders. The antennæ are 4-segmented, and the head is shorter than the thorax, including the scutellum. The middle legs are placed about equidistant from the front and hind pairs (except in *Rhagovelia*). The hind femora do not extend much beyond the apex of the abdomen. The ocelli are obsolete or absent. Beak 3-segmented; tarsi 1 or 2-segmented in front, and 2 or 3-segmented in the others. Most of these bugs are small.”

KEY TO THE GENERA.

- A. Last antennal segment longest.
 - B. Ocelli in contact with inner margin of eyes.....*Macrovelia*.
 - BB. Ocelli absent*Microvelia*.
- AA. First antennal segment longest.
 - B. Third segment of middle tarsus split and with feathery hairs set in slit, *Rhagovelia*.
 - BB. Intermediate tarsi not split.....*Velia*.

GENUS RHAGOVELIA Mayr.

Rhagovelia Mayr, 1865, Verh. Zool.-bot. Ges. Wien, 15:445.

Baccula Stal, 1865, Hem. Afr., 3:157.

Neovelie White, 1879, Jour. Linn. Soc. Lond., Zool., 14:487.

Trochopus Carpenter, 1898, Ent. Mo. Mag., 34:78.

The original description by Mayr is as follows:

“Velie proxima. Caput antice truncatum infra retractum; oculi approximati. Tarsi antici breves triarticulati, articulis 1 et 2 brevissimis globulosis,

articuli apicali fusiformi, infra medio exciso biunguiculato, tarsi intermedii triarticulati posticis triplo longiores, articulo basali minutissimo, secundo longo cylindrico, apicali secundo longo cylindrico, apicali secundo æquilongo, subfusiformi, ab apice ad basin fissura longitudinali, e qua oriuntur unguiculi 2 longissimi parum curvati."

The genus may be quickly characterized by five structures: 4-segmented antennæ, the 3-segmented beak, the 3-segmented tarsi on all legs, the basal antennal segment longest, and the third tarsal segment of the intermediate leg split three-fourths of its length and with feathery hairs in this split. The largest known specimen is 8.5 mm. in length and over 2 mm. wide across the pronotum, while the smallest species is about 2.5 mm. in length.

STRUCTURAL CHARACTERS USED IN CLASSIFICATION.

The outstanding peculiarity of the genus is the condition of the third tarsal segment of the middle leg. This segment is split for three-fourths of its length and provided with about twenty plumose hairs arising from the base of the cleft. The purpose of these hairs is to support the insect upon the surface of the water, the hairs being spread out fanlike. The hairs are also used for swimming under water. See the drawing of this segment in plate V, fig. 12.

Another peculiarity present among some members of the genus is the sutured-off pronotum. This condition is found among a group of small South American forms (and *tenuipes* from Mexico), these forms probably being more primitive. Among most species the pronotum is as broad as long with a small, or even completely hidden, mesonotum. In this primitive group the pronotum is one-third as long as wide, and the mesonotum is longer than the pronotum, the suture between the two being straight and distinct. To this group belong twelve or even more of the known species.

Of the many characters used in classification the presence of a curved hook at the apical tip of the posterior tibiæ has proven one of the more distinct. Three species have the posterior tibiæ armed with this definite hook, while the remainder may, or may not, have a straight spur at the apex. The function of the hook or spur is unknown, but in all probability it is unimportant.

A character recently used in many groups of insects, including the *Rhagovelia*, is the proportion existing between the measurements of one part of the body and those of another part. In the present paper the proportional lengths of the antennal and leg segments are used. Although individuals may show a slight variation, the character is considered of sufficient importance to justify its use and can

be depended on if several specimens are examined. For the sake of brevity, the antennal formula (segment I, seg. II, seg. III, seg. IV) and the leg formulæ (femur, tibia, tarsal seg. II, tar. seg. III) are omitted from further statement. All formulæ given belong to the original authors by direct quotations or by interpretation of the original description.

Valuable characters are found in the segments of the posterior legs. The femur is sometimes thickened or swollen to an enormous size, that of the male always being larger than that of the female. The size of the hind femur is subject to wide variation, ranging from enormously incrassate to normal within certain species. In which case the hind tibia may vary from strongly curved to straight, the amount of curvature accompanying the extent of the incrassate condition of the femur. On the inner or posterior side of the femur there are usually numerous spines arranged in distinct groups according to the species. The tibia is usually denticulate, the species varying in this respect from none to arrangements of one or two rows, and sometimes having one to three longer spines. The apex of the tibiæ is frequently armed with a curved hook or a straight spur. On the larger specimens the coxæ and trochanters may be armed with minute teeth also. The females and the winged forms always have less armature than the apterous males.

GENITALIA.

Characters found in the genitalia are now being used by workers in many insect orders. The genitalia of the *Rhagovelia* have proved valuable in separating groups and even the species discussed in this paper. The present work is not a morphological discussion of these characters, but refers to the genitalia only for their taxonomic value. All drawings are from the male sex.

Two papers that have been very useful in this study are those on the genitalia of *Rhynchota* by Singh-Pruthi in England and Ekblom in Sweden. Since both papers were written about the same time, neither author had the benefit of referring to the other and therefore their explanations and terminology differ in some respects. I have followed both in part, but in most cases have adopted the terminology of Ekblom.

According to Singh-Pruthi the abdomen of a hemipterous insect consists of ten almost complete segments, the ninth being modified to bear the genitalia. This ninth segment, called the hypandrium, is spoon-shaped and much enlarged. Segment ten (the "anal lid" of Ekblom) is a long, more or less tubular structure covering the open

ninth segment, and consists of two parts: the supra-anal plate over, and the podical plate under, the anal tube (see Pl. I, Fig. 3). In some species of *Rhagovelia* the supra-anal plate is modified on its dorsal surface by having two or three posteriorly projecting "horns."

Externally the parts of the genitalia visible are the hypandrium, the supra-anal plate, and the claspers (the "parameres" of Singh-Pruthi, and "copulation hooks" of Ekblom). The claspers are simple, bent at an angle inwardly, with a slight convexity on the inner side at the point of curvature, and at rest extended toward the center in a protecting manner over the genital opening. In all species the claspers are covered with numerous small and a few large hairs, and are frequently pointed. The hypandrium may be modified by depressions on its ventral surface and by prolongation.

If the anal lid is removed, the internal genitalia is exposed (Pl. I, Fig. 4). In the center is the penis which is attached at its lower posterior surface to two points of a broad, semicircular membrane, the lever (after Ekblom, the "basal plates" of Singh-Pruthi). To the lever are attached the various muscles for protraction and retraction of the penis, the lever itself being attached to the hypandrium by a tendon at the same point as the claspers (at *x*, in Pl. I, Fig. 4).

On removing the penis and the lever (Pl. I, Fig. 2), we see that the penis is an obovate, slightly "chitinized" structure. On further examination and dissection it is found that there are two sections of a faintly "chitinized" membrane surrounding a membranous ovoid body (probably the "swell-body" of Ekblom). In the central body are an unpaired and two paired structures, more strongly chitinized and probably the "vesica appendages" mentioned by Singh-Pruthi. Into one pair of these appendages (*pa 1*) enter the branched ejaculatory ducts.

In the present study the claspers of the male have proven to be distinctive for each species in many cases. Whenever possible a drawing was made of the clasper of all species of *Rhagovelia* obtained. Where the claspers of closely related groups appeared to be similar, an appendage of the penis (*pa 1*) has been satisfactorily used for specific determinations.

DETERMINATIONS.

Dr. H. B. Hungerford, under whose direction this work was undertaken, spent eight months of 1928 in Europe, studying type material in all important European museums. He carried with him several thousand specimens, representing all groups of aquatic and

semiaquatic Hemiptera in the University of Kansas Museum and many from the Smithsonian Institute. Among the material were over one hundred specimens of *Rhagovelia*, representing every group at hand. These specimens were compared with types and general material in the British Museum, the Berlin Museum, and the Museum of Vienna. Besides comparison with types, Doctor Hungerford made notes on type and other specimens discovered in the foreign museums. He found eleven unnamed specimens of *R. gigantea* Gould, for the description of this species then had not been published. These specimens were loaned to Doctor Hungerford through the courtesy of Doctor Horvath, and much new material was obtained in England.

Determinations in this paper are based, whenever possible, on the observations of Doctor Hungerford in Europe, credit being given him under each species. Other determinations were made from type material in this country and from published descriptions.

The writer is greatly indebted to Doctor Hungerford, under whose direction this work has been completed, especially for his helpful suggestions and his examinations of European types. The writer is also indebted to Dr. P. J. Chapman, of the Virginia Truck Experiment Station, for his helpful suggestions and criticisms in completing this work.

KEY TO THE SPECIES OF RHAGOVELIA OF THE WESTERN HEMISPHERE.*

1. Posterior tibia armed at apex with a hook.....	2
Posterior tibia with or without a distinct spur.....	4
2. Terminal genital segment mucronate.....	<i>uncinata</i> Champ.
Terminal genital segment not mucronate.....	3
3. Pronotum fuscous; posterior femur armed with seven long teeth, the two inner ones longer and thicker.....	<i>elegans</i> Uhler.
Pronotum rufo-castaneous; posterior femur armed with five or six long teeth, the first, second and fourth longest, the first and second being a little more distant than the others.....	<i>insularis</i> Champ.
4. Pronotum sutured-off from mesonotum in apterous forms.....	5
Pronotum not sutured-off from mesonotum.....	16
5. Antennal segment III as long as II and longer than IV.....	6
Antennal segment III shorter than II or IV.....	14
6. Tarsal segment II of intermediate leg much longer than segment III.....	7
Tarsal segment II less than, equal to, or only slightly longer than segment III.....	9
7. Posterior femur unarmed.....	8
Posterior femur armed with one long and three or four short teeth.....	<i>tenipes</i> Champ.
8. Legs long; posterior tibia much longer than the femur.....	<i>longipes</i> n. sp.
Legs normal in length.....	<i>plumbea</i> Champ.
9. Tarsal segment II of intermediate leg less than III.....	10
Tarsal segment II equal to, or greater than III.....	11

* This key is in part copied after Champion and Bueno, but additions and rearrangements have been made, so that most of the work is original. Four species have been left out, due to the fact that the descriptions are inadequate for obtaining characters distinctive enough to use in a key. These species are *hirtipes* D. & H., *trillii* (White), *whitei* (Bredin), and *vivida* (White). Notes are listed under each of these species. *Excellentis* D. & H. is also omitted, being listed as a synonym of *distincta* Champion.

10. Posterior femur armed with one long and three short teeth.....*spinosa* n. sp.
Posterior femur armed with one long and eight to ten short teeth....*angustipes* Uhler.
11. Apex of posterior tibia armed with straight spur..... 12
Apex of posterior tibia unarmed.....*gregalis* D. & H.
12. Connexivum of female abruptly rounded and clothed at apex with longer hairs; antennal segments II and III equal; posterior tibia equals femur....*regalis* D. & H.
Connexivum without longer hairs at apex; antennal segments II and III unequal; posterior tibia unequal in length to femur..... 13
13. Anterior tibia with groove; posterior tibia with serrate teeth throughout..*obscura* n. sp.
Anterior tibia without groove; posterior tibia slightly sinuate and with only a few small teeth.....*confusa* n. sp.
14. Posterior femur of male enormously incrassate.....*calopa* D. & H.
Posterior femur normal or slightly incrassate..... 15
15. Posterior femur unarmed.....*festu* Kirk.
Posterior femur armed.....*salina* (Champ.).
16. Pronotal length of apterous form not to exceed $\frac{3}{4}$ the width exposing much of the mesonotum 17
Pronotal length subequal to or greater than the width..... 18
17. Antennal segment I thickened and segment III club-shaped.....*lucida* n. sp.
Antennal segments normal.....*trista* n. sp.
18. Anterior tibia strongly dilated especially in male (greatest width about $\frac{1}{4}$ length); connexivum of female much narrowed in from the base at first, afterwards continuing subparallel..... 19
Anterior tibia not strongly dilated; connexivum reflexed or vertical, and parallel.... 22
19. Posterior tibia sinuate in the male*..... 20
Posterior tibia straight..... 21
20. Posterior femur armed with regular teeth, and posterior tibia slightly sinuate in the male with regular teeth.....*collaris* (Burm.).
Posterior femur greatly incrassate, armed with several large teeth; posterior tibia strongly sinuate and armed with a stout spine at apical two-fifths.....
collaris var. *planipes* n. var.
21. Antennal segment I twice as long as segment II.....*collaris* var. *pulchra* n. var.
Antennal segment I not twice as long as segment II.....*tayloriella* Kirk.
22. Intermediate femur constricted at middle.....*spinigera* Champ.
Intermediate femur not constricted..... 23
23. Posterior femur of male strongly incrassate (width $\frac{1}{4}$ to $\frac{2}{3}$ of the length) and dentate; posterior tibia also strongly dentate..... 24
Posterior femur of male slightly or moderately incrassate (width less than $\frac{1}{4}$ of the length)..... 33
24. Intermediate tarsal segment II shorter than III..... 25
Intermediate tarsal segment II longer than III.....*varipes* Champ.
25. Posterior femur of male with large, stout tooth at apical third, preceded by five stout teeth; length 8 mm.....*gigantea* Gould.
Posterior femur not so armed; length 7 mm. or less..... 26
26. Denticulations on posterior tibia of male regular..... 27
Denticulations on posterior tibia with some large teeth..... 29
27. Tarsal segments of intermediate leg longer than tibia.....*bakeri* Berg.
Tarsal segments of intermediate leg equal to or shorter than tibia..... 28
28. Posterior tibia longer than femur.....*becamcri* n. sp.
Posterior tibia shorter than femur.....*sinuato* n. sp.
29. Posterior tibia of male denticulate and with three long teeth.....*crassipes* Champ.
Posterior tibia with only one long tooth..... 30
30. Posterior tibia of male straight*.....*femoralis* Champ.
Posterior tibia sinuate..... 31
31. Posterior femur of male armed with two irregular rows of teeth and one large tooth on the middle above.....*robusta* n. sp.
Posterior femur armed otherwise..... 32
32. Posterior femur of male armed with a row of six large spines, the second being the longest, and also one large spine on the lower surface.....*castanea* n. sp.
Posterior femur armed with two irregular rows of teeth, the first and third being the longest*relicta* n. sp.

* See discussion on page 10.

33. Length 8 mm. or more.....*gigantea* Gould.
Length 7 mm. or less..... 34
34. Apterous female with connexivum vertical and male usually flat and broad..... 35
Apterous female with connexivum reflexed..... 39
35. Connexivum of apterous female much narrowed in from base at first, afterwards continuing subparallel..... 36
Connexivum subparallel, or gradually tapering posteriorly..... 37
36. Connexivum of female ending in stout blunt spine; posterior femur of male armed with about nine spines in two rows.....*williamsi* n. sp.
Connexivum of female not projecting apically; posterior femur of male with seven spines in single row.....*amazonensis* n. sp.
37. Posterior tibia sinuate; anterior tibia normal..... 38
Posterior tibia straight; anterior tibia dilated.....*armata* Champ.
38. Posterior femur with a regular row of teeth.....*beameri* n. sp.
Posterior femur with two rows of teeth and with one large tooth at basal third and another at the middle.....*sinuata* n. sp.
39. Intermediate tibia twice as long as third tarsal segment; connexiva in female not meeting above the abdomen.....*rivale* Bueno.
Intermediate tibia less than twice as long as third tarsal segment..... 46
40. Pronotum produced into a spiniform process..... 41
Pronotum not produced into a spiniform process..... 44
41. Pronotum of apterous forms with spiniform process.....*oriander* Parshley.
Pronotum of winged forms only with spiniform process..... 42
42. Tip of pronotal spine expanded and emarginated.....*obesa* Uhler.
Tip of pronotal spine of normal width..... 43
43. Posterior femur equal to or longer than tibia; length of body about 5 mm.
distincta Champ.
Posterior femur shorter than tibia; length 4 mm.....*chorentes* Hussey.
44. Connexiva of female diverging caudally over the last abdominal segment.....
distincta Champ.
Connexiva of female close together or meeting at distal end..... 45
45. Pronotum of apterous female armed with a long spiniform process; pronotum of apterous male sharply pointed posteriorly.....*oriander* Parshley.
Pronotum of apterous forms not produced posteriorly..... 46
46. Anterior trochanter of male armed with a black spine..... 47
Anterior trochanter unarmed..... 48
47. Tarsal segments II and III of intermediate legs subequal; length 3.8-4.4 mm.....
arctoa Bueno.
Tarsal segment III longer than II; length 3.2 mm.....*knighti* Drake and Harris.
48. Posterior tibia longer than femur.....*chorentes* Hussey.
Posterior tibia subequal to or shorter than femur.....*flavicincta* Bueno* and *obesa* Uhler.

LIST OF THE SPECIES OF RHAGOVELIA OF THE EASTERN HEMISPHERE.

anceipes Haglund:

1895. Ofv. Ak. Forh., p. 476. Habitat: Guinea.

australica Kirkaldy, G. W.:

1908. Sydney Proc. Linn. Soc., 32:783. Habitat: Queensland.

insignis Distant:

1903. Fascic. Malay. Zoöl., I:256. Habitat: Malay. Referred to *Microvelia*. New combination.

maculata Distant:

1903. Ann. Mag. Nat. Hist., (7):12:472. Habitat: Nigeria (Africa).

nigricans (Burmeister):

Velia nigricans Burmeister—

1835. Handbuch der Entomologie, 2:212.

Rhagovelia nigricans Mayr—

1865. Verh. Zoöl.-bot. Ges. Wien, XV, p. 445. Habitat: Africa. New records: Egypt, Ceylon, and Seychelle Islands.

* The apterous forms of these two species are too close together to key out. In *R. obesa* Uhler the first segment of the antenna appears to be relatively longer than the fourth in comparison with *R. flavicincta* Bueno.

peggia Kirkaldy:

1901. Ann. Mus. Genova. 40:805. Habitat: New Guinea.

ravana Kirkaldy:

1901. Entomologist p. 209. Habitat: Ceylon.

reitteri Reuter:

Ofv. Fin. Soc., 25:39. Habitat: Addah.

RHAGOVELIA OF WESTERN HEMISPHERE.

Rhagovelia amazonensis n. sp.

Antennæ: 20:12:12:12.

Intermediate legs: 44:33:13:19.

Posterior legs: 36:28:2:8.

General color dark brown, sometimes lighter; clothed with yellow pubescence. Pronotum with narrow, transverse, light brown or yellow band across anterior margin. All coxæ, anterior trochanters, intermediate and posterior trochanters in part, the acetabula in part, base of anterior and posterior femora, base of antennæ, and edge of connexivum, light brown. Pronotum obtusely rounded behind, covering the mesonotum; metanotum slightly emarginate behind. Venter varying from grayish-black to brown with gray sutures. Anterior trochanters unarmed; posterior tibia armed at apex with a spur.

Apterous Male. Connexiva broader at the center, tapering slightly anteriorly and posteriorly. Posterior trochanter armed on inner side with one stout spine. Posterior femur slightly incrassated, armed at basal third with a long spine, followed by six small, stout spines.

Apterous Female. Abdomen broad, subparallel. Connexiva nearly vertical. First and fourth dorsal segments of the abdomen gray; segments two with numerous long fine hairs. Posterior femora much as in the male, with the spines a trifle longer. Connexiva and abdomen ending with numerous stiff hairs. First genital segment flat and obtusely rounded; below with median carina. Posterior tibia sinuate, denticulate on the posterior margin and armed at apex with a long stout spur.

Length, 3.5-3.7 mm.; width, 1.15 mm.

Holotype, apterous male; allotype, apterous female; paratypes, forty apterous females. All from Solimoes river, Manacapuru, Amazonas, Brazil. April, 1926; S. M. Klages. All types are in the University of Kansas collection.

Comparative Notes. This species is similar to *R. williamsi* n. sp., even the male claspers being similar in shape, but differing in size. The connexiva gradually decreases in size posteriorly in this species, while in *williamsi* each connexivum ends in a sharp spinelike projection.

Rhagovelia angustipes Uhler.

R. angustipes Uhler. Proc. Zool. Soc. Lond., p. 215, 1894.

R. angustipes Champion. 1898. Biol. Cent.-Amer., Het., Vol. 2.

R. angustipes Kirkaldy. 1900, Ent., 34:308.

A small black species similar in form to *R. obesa* Uhler. Antennal segment I longer than II, segment II and segment III subequal in length. Pronotum sutured off from mesonotum and trapezoidal in front of humeral angles; mesonotum triangular. Posterior femora slightly thickened and armed beneath

with a row of fine teeth; tibia clothed with many stiff hairs. Genital segments and the last abdominal segment in the center are orange in color.

Length, 3 to $3\frac{1}{2}$ mm.; width, $1\frac{1}{4}$ mm.

Notes. Four specimens from Tena, Ecuador, were compared with the type by Doctor Hungerford and determined to be the same. These specimens differ from the description given in having the pronotum sutured off from the mesonotum. However, this variation in *R. angustipes* was noted by a previous writer.

Further description of the Ecuador specimens:

Antennæ: Male, 20:11:13:13; female, 20:10:12:13.

Intermediate legs: 42:28:13:19; 41:27:12:20.

Posterior legs: 34:34:4:9; 32:33:4:9.

Apterous Male. Genital segments large. Posterior femur slightly incrassate, being about equal to intermediate femur at base; armed with one tooth at the apical two-fifths, followed by 8 or 10 short teeth. Posterior tibia armed only with slender spur at apex. Venter with distinct median carina, the last segment depressed slightly on each side.

Apterous Female. Dorsum of last five abdominal segments with shining black spot; dorsum humped on the first and second segments. Posterior femur armed with one tooth at apical third, followed by four, and possibly more, minute teeth.

Distinguished from related species by shorter second tarsal segment, by antennal proportions, and the male clasper.

Distribution Records. Mexico, Panama, St. Vincent, Grenada, and Venezuela. New record: Ecuador.

Rhagovelia arctoa Bueno.

R. arctoa Bueno. Trans. Amer. Ent. Soc., 50:243-252, 1924.

Antennæ: Male, 16:9:10:9; female, 17:10:9:8.

Intermediate legs: 35:25:15:15.

Posterior legs: 25:22:3:5; 28:25:3:7.

A small black species similar in form to *R. obesa* Uhler. Original description is as follows:

"Males, Apterous. Femoral spine not very slender, straighter, followed by six blunt spines, stouter in comparison, more prominent; femoral spine three-fifths length of femur from apex; posterior tibia denticulate; posterior tars. seg. II: seg. III::3:6; anterior trochanters with a stout black spine on the outer aspect; abdominal segments two to five subequal, six twice as long as the preceding one.

"Females, Apterous. Pronotum posteriorly sinuately truncate, feebly carinate longitudinally. Posterior femora with a sharp curved spine followed by smaller ones, as in male; not much stouter than intermediate femora. Anterior trochanters without a spine; connexivum reflexed, meeting above last abdominal segment and terminating acutely in two long divaricating spines; genital segment trapezoidal, polished above; edge of first segment of connexivum with long hairs appressed to form a seeming spine."

Length, 3.8-4.4 mm.; width, 1.1-1.4 mm.

Types are in the collections of the University of Kansas, W. E. Hoffman, H. M. Parshley, J. R. de la Torre Bueno, and the American Entomological Society.

Notes. This species, of which the type and thirteen paratypes as well as 150 specimens collected by Dr. H. B. Hungerford at the type locality, has been carefully studied and found to be very close to *R. obesa* Uhler. The claspers of the two species are decidedly different, those of *arctoa* being much longer (long 7, wide over 3; *obesa*, long 5, wide $2\frac{1}{2}$).

Externally the two species may be distinguished by the darker legs of *arctoa*, which lack the pale basal markings of the anterior femora, and the black coxæ and trochanters of the intermediate and posterior legs. In *obesa* the coxæ, trochanters, and the base of the anterior femora are marked with flavous.

Distribution Records. Minnesota, Michigan, and Ontario, Canada.

Rhagovelia armata (Burm.).

Velia armata Burmeister. Handb. der Ent., 2:212, 1835.

Rhagovelia armata Mayr. Verh. Zööl.-bot. Ges. Wien, 15:445, 1867.

R. armata Champion. Biol. Cent.-Amer., Heter., 2:136, 1898.

R. armata Kirkaldy. Ent., 34:308, 1900.

R. armata Van Duzee. Check list of Hemiptera, N. Y. Ent. Soc., 1916.

R. armata Van Duzee. Cat. Hem. Am. N. Mex., 1917.

R. armata Hungerford. Kan. Uni. Sci. Bul., XI, Dec., 1919.

The writer's description:

A large brownish-black species. Antennal segment I more than one-half longer than II, segments II and III subequal, segment IV less than III (32:20:20:18). Intermediate leg with tarsal segment III equal to II. Pronotum of winged form produced behind into a long spiniform process, that is armed beneath with a stout spine; pronotum of apterous forms abbreviated and rounded behind. Venter with segments I and II and the intercoxal portion of metasternum depressed. Anterior tibia dilated in outer half and grooved beneath. Posterior femora moderately incrassated, armed at middle with one long tooth and a row of short teeth extending thence to apex; posterior tibia slightly sinuate and faintly denticulate and armed at apex with a short straight spur.

Notes. Champion says that *R. armata* is nearest allied to *R. femoralis*, from which it differs in the more elongate body, the longer legs and antennæ, the less incrassate posterior femora in the male and the hind tibiæ without long teeth. Also near to *R. distincta*.

Length, $5\frac{3}{4}$ mm.; width, 2 mm.

Distribution Records. Mexico, Texas.

Rhagovelia bakeri Berg.

Rhagovelia bakeri Bergroth. Psyche, 21:74, 1914.

The writer's description:

A black species with antennal formula of 30:20:18:17. The tarsal segments of the intermediate leg a little longer than the tibia; second tarsal segment slightly shorter than the third. Last dorsal segment of male truncate at apex, last ventral segment arcuately emarginate. Posterior femora very strongly incrassate, armed near middle with a large tooth followed to apex by series diminishing in size. Posterior tibia straight, finely toothed beneath,

the teeth of the middle third slightly longer; armed at apex with short straight spur.

Length, 4 mm.

Notes. Similar to *R. femoralis* Champ., but differing in structure of antennæ, the venter not ridged, and the posterior tibia without large teeth.

Distribution Record. Nicaragua.

Rhagovelia beameri n. sp.

Antennæ: 46:28:32:26.

Intermediate legs: 88:72:31:37.

Posterior legs: 77:96:10:19.

General color blackish, with brown pubescence. Head with usual impressed lines. Antennæ, legs, and sides of body clothed with longer hairs, with a few scattered setæ (except on the two apical antennal segments). Base of antennæ, base of anterior femora, all coxæ, anterior and posterior trochanters, propleura, edge of connexivum, and two spots on the pronotum, brown. Venter black shading to brown posteriorly. Pronotum obtusely rounded in apterous forms. Anterior trochanters unarmed; posterior tibia with a stout spur.

Apterous Male. Posterior femora enormously incrassated, armed with numerous short teeth arranged in two regular rows, the upper row longer and with eight teeth, the lower row of minute teeth and extending nearly across the femur. Posterior tibia bowed inwards to beyond the middle and thence curved slightly outward to the apex, denticulation small near the base and increasing in size toward the apex. Connexivum broad but little reflexed. Sixth dorsal segment truncate at the apex. Genital segments and last abdominal segment clothed with bristly hairs. Venter carinated basally.

Apterous Female. Posterior femora slightly incrassate, a little thicker than the intermediate, and armed with three short spines and usually three minute spines on the apical third. Posterior tibia straight and unarmed. First genital segment set in between ends of connexiva and rounded posteriorly; ventrally with a distinct longitudinal suturelike groove. Connexiva semi-vertical. First ventral abdominal segment carinated.

Winged Forms. Much as in apterous forms. Posterior femora not so much incrassated. Pronotum of male and female long and bluntly angular (long 37, wide 35). Elytra extending beyond the tip of the abdomen.

Length, male, 6 mm.; female and winged forms, 6.3 mm.

Width, male and female, 1.8 mm.; winged forms, 2.3 mm.

Genitalia: The claspers of the male resemble no other specimen studied. Its size is nearly twice as large as any other North American species. (See plate III.)

Holotype, apterous male, Cochise county, Arizona, July 29, 1927, R. H. Beamer; allotype, apterous female, same data; morphotype, winged female, same data; paratypes, apterous males and females, same data; also one apterous female, Huachuca Mountains, Arizona, August 1, 1927, L. D. Anderson. All types are in the University of Kansas collection.

Comparative Notes. This species is very similar to *R. armata* (Burm.), being like it in color, size and the posterior legs. It differs from *armata* in the shape of the pronotum, which is produced posteriorly to an acute angle,

but not into a spiniform process (as in the winged forms of *armata*). Also the anterior tibiae are not dilated in their apical half, and the posterior tibiae are more sinuate.

This species is also close to *R. varipes* Champion, differing in having the second tarsal segment of the intermediate leg shorter than the third.

Rhagovelia calopa D. & H.

Rhagovelia calopa Drake & Harris. Proc. Biol. Soc. Wash., 40:131-138, 1927.

Antennae: "31:18:13:16."

Intermediate legs: "64:47:23:28."

Posterior legs: "52 (wide 20):54:5:12."

The writer's description:

A small grayish-black species, with the pronotum distinctly sutured off from mesonotum; the latter is three and a half times longer than the former. Abdomen narrowed posteriorly; connexivum broad, strongly narrowed apically. Anterior trochanters unarmed. The posterior femur enormously swollen and armed with two rows of spines, the lower row shorter and continuing the length of the femur; the upper row of spines irregular, with a longer, stout spine at the basal third and one or two double spines near the middle. The posterior tibia have a double row of short, stout spines with one or two on the apical third very long; tibia armed at apex with a spur.

Length, 2.86 mm.; width, 1.5 mm.

Notes. This species is similar in appearance to *R. femoralis* Champion, but may be readily separated by its sutured-off pronotum. It differs from all specimens with this pronotal character by having enormously incrassated posterior femora.

Distribution Record. Guatemala.

Rhagovelia castanea n. sp.

Antennae: 42:27:24:22.

Intermediate legs: Male, 100:72:25:34; female, 95:68:25:36.

Posterior legs: Male, 78(24):60:6:12; female, 78(20):70:6:12.

General color dark reddish-brown, almost a black; all appendages dark brown. Body clothed with short brown pubescence; sides of body, legs, and genital segments with longer hairs; legs and segments one and two of antennae with scattered setae. Most body sutures black. Pronotum obtusely rounded and with a lighter band in front, wider than long (8:7). Anterior and intermediate acetabula of lighter brown. Venter of same color as dorsum. Posterior tibia armed at apex with short spur; anterior trochanters unarmed.

Apterous Male. Connexivum broad but not reflexed. Body lines straight, tapering posteriorly with no break between last abdominal and first genital segment. First abdominal segment angular at middle. Posterior trochanter armed on posterior surface. Posterior femora greatly incrassated and armed with two apparent rows of spines; the lowermost row with two spines preceded to the base by short teeth; the upper row starting at the apical third and consisting of a series of stout spines. Posterior tibia sinuate and with two rows of teeth, with two teeth near the apex larger.

Apterous Female. Sixth abdominal segment ending with many curved hairs.

Connexivum slightly deeper and more nearly vertical than in the male. Posterior femora moderately incrassated, armed with five larger spines and several small ones, as in the male; teeth on basal third few and small. Posterior tibiae sinuate and denticulate.

Length, 4.6 mm.; width, 1.4 mm.

Holotype, apterous male; allotype, apterous female; paratypes, apterous males and females; all from Mera, Ecuador, 1923, F. X. Williams. Types are in the University of Kansas Museum.

R. castanea n. sp. may be close to *R. collaris* (Burm.). This species has the mesonotum covered by the pronotum, and the metanotum emarginate behind. The genitalia is different from other related species.

The specimens included in this species were first thought to be two species, due to a great variation in color and a slight difference in the armature of the posterior femur. Six specimens are dark while twelve were light brown in color. The lighter colored bugs have a larger posterior femur. Comparison of the genitalia of the two forms reveal them to be the same.

Rhagovelia choreutes Hussey.

Rhagovelia choreutes Hussey. Jour. N. Y. Ent. Soc., 33: June, 1925.

Antennae: "Male, 35:21:19:19; female, 38:22:20:20."

Intermediate legs: "71:53:25:35; 72:56:28:40."

Posterior legs: "54:56:7:14; 57:65:8:16."

The writer's description:

This is a medium-sized, dull black or dark gray species, resembling somewhat *R. obesa* Uhler. Anterior trochanters unarmed. Posterior femur of male moderately incrassated and armed near middle with one long spine and this followed by five or six smaller spines distally. Posterior femur of female about equal in size to the intermediate femur at base. First connexival segment is without a tuft of hairs at apical angle.

"Connexivum (of female) meeting above the last abdominal segment, occasionally above the fourth segment, but not (as in *obesa*) meeting above the fourth segment, then diverging slightly to meet again above the sixth; apex obliquely truncate at an angle of about 45 degrees, forming two short blunt spines about as long as the width of the connexivum, not diverging posteriorly, pilose at their tip. Apex of sixth abdominal segment with a tuft of long curved cilia on each side at the upper lateral angle of the first genital segment, and with several shorter cilia at each side below; the dorsolateral cilia more or less agglutinated, resembling a slender curved spine at either side the genital segment."

Length, 3.8 mm.; width, 1.3 mm.

Notes. In the University of Kansas collection are two groups that belong to *choreutes*. One group of fifty-six specimens was collected in the Arbuckle mountains, Davis, Okla., in 1925 by Dr. R. H. Beamer. These are considered typical of the specimens described by Hussey. The other group of over 110 specimens are from Eddy county, New Mexico, collected by Dr. P. A. Readio in 1927. The specimens are slightly larger and more nearly a black in color, but are probably the same species, or at least a variety of the former. The genitalia are quite similar.

The winged forms have the pronotal process, the females having a long spiniform projection and the males being strongly angular.

Distribution Records. Florida, Oklahoma, and New Mexico.

Rhagovelias collaris (Burm.).

Velia collaris Burmeister. Handb. der. Ent., 2:212, 1835.

Velia fiebrii Guérin. Sagra's Hist. Cuba, 2:7:174, 1857.

Rhagovelias collaris Mayr. Verh. Zool.-bot. Ges. Wien, 15:445, 1865.

R. collaris Mayr, Reise d. Oster. Freg. Nov., Zool. Thiel, Zwieter Band, Hemip., p. 180, 1867.

R. collaris Uhler. Proc. Bost. Soc. Nat. Hist., 19:4:434, 1872.

R. collaris Johnson & Fox. Ent. News, 3:60, 1892.

R. collaris Kirkaldy. Ento., 33:72, 1900.

R. collaris Kirkaldy. Ento., 34:308, 1900.

R. collaris Champion. Biol. Centr.-Amer., Heter., 2:134, 1898.

The writer's description based on a specimen from Haiti that was compared with type by Doctor Hungerford:

Antennæ: 28:16:18:14.

Intermediate legs: 60:45:21:25.

Posterior legs: 50:53:6:13.

General color grayish-black with golden pubescence. Transverse flavous band on pronotum conspicuous. Mesonotum hidden. Base of antennæ, base of anterior and posterior femora, edge of connexivum, and all coxæ and trochanters, light brown. Legs and antennæ of a brownish color. Posterior tibia with spur at apex.

Apterous Male. Anterior tibia greatly dilated apically and grooved on inner side. Posterior femur greatly incrassate and armed with two rows of spines, the lower row small and equal throughout, the upper row of about twelve teeth decreasing in size apically. Posterior tibia armed with stout regular spines throughout and slightly sinuate.

Apterous Female. Anterior tibia somewhat dilated. Connexivum vertical and much narrowed in from the base at first, afterwards continuing subparallel. Posterior femur slightly incrassate, armed with four large teeth and four or five minute teeth. Posterior tibia as in the male.

Length, male, 4.7 mm.; female, 5.3 mm.; width, 1.6 mm.

Notes. In his examination of the specimens in the Berlin museum, Doctor Hungerford found four types of *Velia collaris* Burm. They were labeled as follows:

1. Wingless female:

- a. White label with "3406" printed.
- b. Green label with "Port au Pr.,"; also the word "Ehrenb."
- c. Green label with "*Velia collaris* Br."
- d. White label with "*V. armata* Burm."

2. Wingless female:

- a. White label with "Cat. No. 3406" written.
- b. Green label with "Port au Pr. Ehrenburg."
- c. White label with "*Velia armata* Burm."

3. Wingless male:

- a. White label with "Cat. No. 3406" written.
- b. Green label with "Port au Pr. Ehrenburg."
- c. White label with "*Velia armata* Burm."

Doctor Hungerford says that his specimen 28,293, female, from Port au Prince, Haiti, is the same as No. 1. The male of 28,293 is not like No. 3, however, but the male of 28,306 from Salvador is similar. Therefore the specimens from Haiti (28,293) are called *Rhagovelias collaris* (Burm.), and the other two similar groups are made new varieties of *collaris*.

Doctor Hungerford says the *collaris* specimens in the Vienna Museum determined in 1865 by Mayr are not the same as the Burmeister types in the Berlin Museum.

Distribution Records. San Domingo, Jamaica, and Cuba.

Rhagovelia collaris var. *planipes* n. var.

Antennæ: 30:18:—:—.

Intermediate legs: 62:44:21:21.

Posterior legs: 56:50:6:13.

General color reddish-brown, clothed with brown pubescence. Transverse band on pronotum light brown. Mesonotum covered by pronotum, metanotum slightly emarginate. Posterior tibia armed with short spur at apex.

Apterous Males. Anterior tibia greatly dilated and excavate beneath. Posterior femur enormously incrassate and armed on the basal third with minute spines followed by two rows of stout spines; the upper row of spines of equal size, but larger than the lower row; at the basal third is one large spine just above the first spine in the upper row. Posterior tibia very strongly sinuate and armed with prominent spines, with those on the apical third.

Apterous Female. Anterior tibia slightly dilated and grooved. Connexiva vertical and much narrowed in from the base at first, afterwards continuing subparallel. Posterior femur slightly incrassate, armed at apical two-fifths with a long spine followed by six to ten spines decreasing in size apically. Posterior tibia nearly straight and with prominent small teeth only on the basal half.

Length, 5.6 mm.; width, 1.7 mm.

Notes. This variety is near the *collaris* type No. 3, of which Doctor Hungerford says "thick hind femora with all spines but two short, one near the outer end and one near the base. Hind tibia curved and armed with blunt spurs on distal third."

This group of specimens were made a variety of *collaris* because of the similarity of the genitalia and claspers, the proportional measurements, and form. The male differs from type No. 3 in having only one large spine on the posterior femur.

Holotype, apterous male; allotype, apterous female; both from Mt. Cacaquatique Dept., St. Miguel, Salvador, December 14, 1925, collected by R. A. Stirton. Types are in the University of Kansas Museum collection. There are also three specimens from Huigra, Ecuador, collected by F. X. Williams. These include a winged male, an apterous male, and an apterous female.

Rhagovelia collaris var. *pulchra* n. var.

Antennæ: 32:16:17:16.

Intermediate legs: 62:44:21:26.

Posterior legs: 54:50:7:13.

General color brownish-black, with the dorsum of abdomen a reddish-brown, and clothed with golden pubescence. Pronotum broadly rounded behind covering the mesonotum, and with a bright yellow-brown transverse band on the anterior margin. Base of antennæ, base of anterior and posterior femora, all coxæ and trochanters, light brown. Venter, connexiva and most of pleura, light brown.

Apterous Male. Anterior tibia greatly dilated and excavate beneath. Posterior femur greatly incrassate and armed with a long tooth at the basal two-fifths, followed by ten teeth decreasing in size apically, and preceded by a row of minute teeth to the base; also a lower row of small teeth. Denticulations on the posterior trochanters. Posterior tibia armed with stout, small teeth not in a regular row and at apices with a stout spur; not sinuate.

Apterous Female. Anterior tibia slightly dilated and grooved. Connexiva vertical and much narrowed in from the base at first, afterwards continuing subparallel. Posterior femur slightly incrassate and armed with seven teeth. Posterior tibia straight and with no visible denticulations.

Winged Male. Much as in the apterous male. Pronotum produced behind into a slightly elevated spine. Posterior femur not so much incrassate.

Length, male, 5 mm.; female, 5.4 mm.; width, 1.6-1.8 mm.

Holotype, apterous male; allotype, apterous female; morphotype, winged male; paratypes, apterous males and females. All are from Dominica Roseau, B. W. I., January 29, 1926, and collected by P. G. Howes. Types are in the University of Kansas collection and in the British Museum.

Notes. This variety is distinct because of its color markings. Many of the individuals have white eyes, while the normal color is brownish-black.

This variety was placed under *collaris* because of similarity of shape, claspers, genitalia, and proportional measurements. It differs from *collaris* var. *planipes* in color and in armature and incrassate condition of the posterior femur. Also in this variety the anterior tibia of the male is not dilated quite so much.

Among the specimens from the British Museum I find a nearly mature apterous male. It appears to be this variety and is therefore listed. It is from Nat. Forest, Lugohl, P. R., March 10, 1927, by W. A. Hoffman.

Rhagovelia confusa n. sp.

Antennæ: 28:16:18:15.

Intermediate legs: 60:38:24:24.

Posterior legs: 47:44:6:10.

General color grayish-black, clothed with brown pubescence; venter bluish-gray. Pronotum with narrow transverse band of flavous with yellow spots each side of median line. Base of antennæ, the anterior and posterior coxæ and trochanters, brown. Sides of body, legs, and two basal segments of antennæ with long hairs and a few scattered setæ. Head with usual impressed median line crossed with a V-shaped suture on the upper surface. Anterior trochanter unarmed; anterior tibia not dilated. Posterior tibia armed with a short spur at apex. Pronotum in apterous forms sutured off from mesonotum.

Apterous Male. Pronotum wider transversely (6:1), sutured off from mesonotum, which is wider transversely also (4:3); mesonotum nearly covering the median portion of metanotum, both truncate on posterior margin. Connexiva wide near base but tapering posteriorly. Sternal sutures marked by ridges. Venter with slight median carina. Last abdominal segment and first genital segment glabrous beneath; genital segments large. Posterior femur slightly incrassate, armed near middle with one long tooth followed by five to eight short teeth. Posterior tibia very slightly sinuate and often with minute teeth.

Apterous Female. Connexivum semivertical, otherwise as in the male. Last three segments of abdomen with shining spots above. Genital segments small. Posterior femur nearly as in the male.

Winged Forms. Pronotum as broad as long. Elytra extending for some distance beyond the genital segments. Legs as in apterous forms.

Length, winged forms, 4.4-4.7 mm.; apterous female, 3.7-3.9 mm.; apterous males, 3.3-3.4 mm. Width, winged forms, 1.6 mm.; apterous forms, 1.4-1.6 mm.

Holotype, apterous male; allotype, apterous female; morphotypes, winged male and female; paratypes, winged and apterous males and females; all collected in Ecuador in 1925 by F. X. Williams. Localities included are Mera, Tena, Oriente, and Napo, Ecuador. Types are in the University of Kansas collection.

Notes. This species belongs to the *tenuipes* group and differs from that species in having the intermediate tarsal segments equal. It differs from *regalis* D. & H. by having the apex of the posterior tibia armed with a spur, and from *regalis* D. & H. in size and antennal proportions. Besides the above mentioned, this species differs in many others characters.

Many of the recent writers on the genus *Rhagovelia* have been using proportional measurements as a specific character. The above proportions are averages from a series of twenty-seven specimens as given below. It can readily be seen that the proportions alone are not good characters and are often misleading, especially in a case where only one or two specimens are to be examined.

VARIATIONS IN PROPORTIONAL MEASUREMENTS.

Number	Antennæ				Intermediate leg				Posterior leg				Sex
	I	II	III	IV	Femur	Tibia	TSI	TSII	Femur	Tibia	TI	TH	
1.....	28	16	17	15	60	37	23	24	46	44	6	12	F
2.....	28	18			65	40	25	25	51	47	6	11	F
3.....	28	16	18	15	60	37	24	25	46	45	5	10	Fw
4.....	28	14			56	35	20	23	44	40	5	10	F
5.....	28	15	17	15	56	37	23	23	44	43	5	10	Fw
6.....	28	15			59	36	20	22	46	44	5	10	M
7.....	32	19	20	17	64	40	26	24	50	47	6	10	M
8.....	28	14	16	14	55	36	20	22	45	41	5	10	Fw
9.....	30	16	20	16					50	46	6	10	F
10.....	28	14			58	36	22	22	46	43	5	10	Mw
11.....	29	16			60	38	27	22	48	44	6	10	Mw
12.....	28	18	19	16	64	38	27	24	51	44	6	10	Mw
13.....	28	17	18	14	62	38	24	24	46	45	6	10	Fw
14.....					63	40	25	25	48	44	6	10	Mw
15.....	28	14	17	14	57	36	23	20	45	40	5	10	M
16.....	29	18	19	16	58	36	22	22	46	42	6	10	M
17.....	30	18			61	39	24	23	49	44	6	10	M
18.....	28	16	18	15	63	38	23	24	50	48			F
19.....	30	18	20		64	40	24	25	48	49	6	10	F
20.....					64	38	24	25	47	48	6	10	F
21.....					64	40	24	25	48	48	6	10	F
22.....	28	18			63	38	24	24	47	44			F
23.....	28	18	19	16	59	37	24	24	46	44	6	10	M
24.....	32	18	19	16	63	40	28	24	54	44	5	9	M
25.....	28	17	19	17	63	39	26	26	51	46	6	10	M
26.....	28	17	18		58	38	24	23	46	42	6	9	M
27.....	28	14			56	35	22	21	47	44	5	9	M
Average...	28	16	18	15	60	38	24	24	47	44	6	10

Male, M. Female, F. Winged, w.

Rhagovelia crassipes Champ.*Rhagovelia crassipes* Champion. Bio. Cent.-Amer., Het., 2:133, 1898.*Rhagovelia crassipes* Kirkaldy. Ent., 34:308, 1900.

Antennæ: 33:20:18:17.

The writer's description:

This is a very large, brownish-black species, characterized by the enormously incrassate posterior femora and the bowed hind tibiæ in the male. Pronotum of winged forms produced posteriorly into a long, raised, spiniform process, which is armed beneath at some distance before the tip. Intermediate tarsi with segment II slightly shorter than III. Posterior femur of male "armed with numerous short teeth, the innermost of these arranged in two regular rows, and with one longer tooth towards the base and three or four others towards the apex; posterior tibia bowed inwards to beyond the middle and curved outwards thence to the apex, shortly denticulate on its edge, and armed with one long tooth at about one-third from apex, a shorter one close to it, one near the apex, and another at the apical angle." Posterior femora of female moderately incrassate, armed with one long tooth a little before the middle and with numerous short teeth from middle to the apex. Sixth dorsal segment truncate at apex in male, and rounded at the apex in the female.

Length, 6-7 mm.; width, $2\frac{1}{2}$ to $2\frac{2}{3}$ mm.

Notes. According to Champion "this species is well characterized by the enormously thickened hind femora and the bowed hind tibiæ in the male sex, both the tibiæ and femora being armed with numerous teeth."

Distribution record: Panama.

Rhagovelia distincta Champion.*Rhagovelia mexicana* Signoret. Bull. Soc. Ent. Fr., (5):7:53:55 1877. (Manuscript.)*Rhagovelia distincta* Champ. Biol. Cen.-Amer., Het., 2:135, 1898.*Velia distincta* Uhler. Walker's Cat. Hemi., 8:161.*Rhagovelia distincta* Kirkaldy. Ent., 33:72, 1900.*Rhagovelia distincta* Kirkaldy. Ent., 34:308, 1900.*Rhagovelia distincta* Van Duzee. Check List of Hemi., 1916.*Rhagovelia distincta* Van Duzee. Cat. of Hemi. of Amer. N. Mex., 1917.*Rhagovelia distincta* Hungerford. Kan. Uni. Sci. Bul., XI, Dec., 1919.*Rhagovelia distincta* Bueno. Ent. News, 32:274, 1921.*Rhagovelia distincta* D. & H., Pro. Biol. Soc. Wash., 40:131, 1927.*Rhagovelia excellentis* D. & H. Pro. Bio. Soc. Wash., 40:131, 1927.

Antennæ: 32:21:20:18.

Intermediate legs: Male, 72:56:32:32; female, 79:60:32:35.

Posterior leg: Male, 55:57:8:13; female, 57:70:8:14.

"Winged Form. Moderately elongate, black, the legs with a green or bluish-green luster, the pronotum with a narrow transverse flavous mark on each side of the disk in front, the base of the antennæ, the prosternum, the coxæ and trochanters entirely or in part, the base of the anterior femora, the connexival margins, and in the males the terminal ventral segment in the middle and the underside of the first genital segment, more or less flavous; the pleura and under surface bluish-gray; the body, legs and antennæ very finely pubescent, and also clothed (the two apical joints excepted) with long scattered setæ, the pronotum usually with a transverse patch of grayish or silvery pubescence on each side in front. Head with a smooth impressed median line; antennæ moderately long, joint 1 about one-half longer than 2, 2 and 3 equal in length, 4 shorter than 2, stout, fusiform. Pronotum with a

distinct median ridge, and produced behind into a spiniform process, the surface sparsely and finely punctured. Legs long and rather slender, the hind tibiae with a very short, indistinct tooth at the apex; intermediate tarsi with joints 2 and 3 subequal in length.

"Male: Anterior tibiae dilated in their apical half; posterior femora moderately incrassate, armed on the inner side with a long, partly flavous tooth at about one-third from the base, and with a row of short teeth extending thence to the apex (in some of the well-developed apterous examples also closely and finely denticulate) and slightly sinuous within. Pronotal spine short. Sixth ventral segment broadly flattened along the middle and feebly arcuate-emarginate at the apex.

"Female: Posterior femora not stouter than the intermediate femora, armed with a very long, acute, blackish tooth at about the middle, and very finely denticulate thence to the apex; posterior tibiae straight, obsoletely denticulate within. Pronotal spine very long, stout, and raised, armed with a strong tooth at the base beneath.

"Length 5, breadth (of the pronotum) $1\frac{1}{2}$ to $1\frac{3}{4}$ mm.

"*Apterous Form.* Male and female: Fusiform, the pronotum abbreviated and rounded behind; the abdomen metallic green above, with a stripe of grayish pubescence running down each side of the dorsal surface; the connexivum very broad in the females, extending inwards and overlapping the dorsal surface of the abdomen, the two portions nearly or quite meeting along the median line.

"*Var. Apterous Form.* Male and female: The anterior femora dark to the base; the coxae and trochanters darker, the latter at most, flavous at the base; the sixth ventral segment broadly flattened, the flattened portion limited on each side anteriorly by a short, angular longitudinal ridge."

Notes. There is a series of specimens in the University of Kansas museum collected by Dr. R. C. Moore in Colorado. These specimens were identified by Bueno as *R. distincta* Champ. several years ago. In 1928 Doctor Hungerford compared these specimens with the type material in the British Museum and says that these specimens are probably *distincta*. In 1927 Drake and Harris described *R. excellentis*, also from Colorado. After a careful examination of three paratypes, from Doctor Drake in the University of Kansas Museum, it was found that the two series of insects are identical. Therefore *R. excellentis* D. & H. is made a synonym of *R. distincta* Champ.

Distribution Records. North America, Mexico, Texas, Indiana, and Colorado.

The varieties of *distincta*: Champion mentions a variety of *distincta*, but does not name it. The writer studied six large series of specimens from the western part of United States. All have a close resemblance to the *distincta* specimens determined by Bueno. Furthermore all seem to fit Champion's original description with exception to the color. After a comparison of the genitalia of the groups it was found that the claspers of the males are similar, but that the structure (pa 1) of the internal genitalia seem constant only for one group. Therefore these series are made varieties of *R. distincta* Champ.

Rhagovelia distincta var. *arizonensis* n. var.

Antennae: 32:18:17:14.

Intermediate legs: 68:47:23:24.

Posterior legs: 55(13):48:6:12.

General color dark brown, the legs with a metallic green luster; clothed with fine golden-brown pubescence. Pronotum with narrow transverse flavous band, with a brown spot in the middle. Pleura and venter brownish-gray, shading off to dull brown posteriorly. Anterior tibia dilated and excavate within.

Apterous Male. Mesonotum and metanotum truncate, the former partly covered by the pronotum. Abdomen with a shiny spot on each tergite. Posterior femur strongly incrassate, armed at basal two-fifths with a long brown spine, followed by twelve or thirteen shorter stout spines and preceded by a row of minute brown spines. Length, 4.7 mm.; width, 1.3 mm.

Apterous Female. Mesonotum and metanotum slightly emarginate behind. Connexivum strongly reflexed, and nearly meeting over the fourth and fifth segments in some specimens, while nearly vertical in others. Length, 5.4 mm.; width, 1.5 mm.

Winged Forms. Male with pronotum prolonged posteriorly to form an acute angle. Posterior femur slightly incrassate. Female with pronotum prolonged posteriorly into a spiniform process which is armed beneath. Length, 5 mm.; width, 1.8 mm.

Holotype, apterous male, Shinono creek, 1,000 feet above mouth of Grand Canyon (Arizona), September 3, 1925, R. C. Moore; allotype, apterous female, same data; morphotypes, winged male and female, same data; paratypes, many winged and apterous females and males, same data; and also from Enes chasm, Arizona, 500 feet above Colorado river, Shinono quadrangle, September 5, 1923, collected by R. C. Moore.

Notes. This variety is broader than *distincta* Champ., and is brown in color. It is somewhat similar to the variety *harmonia* n. var., also from the Grand Canyon.

Rhagovelia distincta var. *cadyi* n. var.

Antennæ: Male, 29:15:17:15; female, 32:18:18:16.

Intermediate legs: 66:50:26:24; 76:54:25:25.

Posterior legs: 50:51:7:11; 56:61:8:11.

General color black, the legs with a greenish luster; pronotum with narrow transverse, flavous mark on each side of a slight median carina.

Apterous Male. Mesonotum nearly covered by pronotum and truncate behind. Abdomen with a shiny spot on each tergite. Last segment of venter depressed posteriorly and with a distinct ridge on either side. Posterior femur moderately incrassate, armed at the basal two-fifths with a long, bent black spine which is followed by ten shorter stout spines and preceded by a row of short black teeth. Length, 4.8 mm.; width, 1.4 mm.

Apterous Female. Mesonotum and metanotum slightly emarginate posteriorly. Apices of first, fourth and fifth segments of the connexiva with tufts of fine hairs. Posterior femur slightly incrassate, armed at near the middle with a long spine followed by five or six small spines. Length, 5.2 mm.; width, 1.5 mm.

Holotype, apterous male; allotype, apterous female; paratypes, apterous males and females; all from North Platte, Wyo., September 2, 1926, collected by Geo. Cady. All types in the University of Kansas collection.

The male of this variety is much like *distincta*; the connexiva of the female is not so much reflexed and is semivertical.

Rhagovelia distincta var. *harmonia* n. var.

Antennæ: 29:18:16:14.

Intermediate legs: 62:44:25:26.

Posterior legs: 50(16):56:6:12.

General color dark brown, with all appendages of a reddish-brown color. Anterior tibia somewhat dilated.

Apterous Male. Much as in var. *arizonensis* n. var., but the posterior femur is slightly more incrassate. Length, 4.7 mm.; width, 1.3 mm.

Apterous Female. Connexivum much reflexed and nearly meeting over the third segment. Abdomen narrower than in *arizonensis*. Length, 5.3 mm.; width, 1.5 mm.

Holotype, apterous male; allotype, apterous female; paratypes, apterous males and females; all from Grand Canyon, Arizona, August 11, 1927, by P. A. Readio; also specimens from Yavapai county, Arizona, August 9, 1927, by L. D. Anderson.

Rhagovelia distincta var. *modesta* n. var.

Antennæ: 24:15:15:14.

Intermediate legs: 56:38:20:23.

Posterior legs: 46:42:6:10.

General color grayish-black, the legs with a brownish luster. Base of antennæ, edge of acetabula, anterior and posterior coxæ, trochanters, base of anterior and posterior femur, edge of connexiva, and under sides of genital segments, light brown. Anterior tibia dilated apically.

Apterous Male. Pronotum broader than long, covering most of mesonotum; metanotum truncate. Last segment of venter depressed posteriorly and with a distinct carina each side. Posterior femur moderately incrassate, armed at basal two-fifths with a long brown spine, which is followed by ten to twelve shorter stout spines and preceded by a row of minute black spines. Length, 4.6 mm.; width, 1.3 mm.

Apterous Female. Connexiva strongly reflexed but not meeting, and running subparallel over the abdomen; hairs on apices of first segment slightly longer. Supra-anal plate with lateral tufts of stiff brown hair. Intermediate femur somewhat flattened near the middle. Posterior femur more incrassate than intermediate, slightly swollen at the middle and armed with a long spine at apical two-fifths and five or six shorter ones to the apex. Length, 4.8 mm.; width, 1.4 mm.

Holotype, apterous male; allotype, apterous female; paratypes, apterous males and females; all from San Antonio, Mexico, July 17, 1927, by R. H. Beamer. All types are in the University of Kansas Museum.

Notes. This variety is somewhat like *distincta* and is very similar to variety *valentina* n. var. *Valentina* differs from this variety in the female having a longer and narrower abdomen, and the posterior femur armed with two large and five small teeth, and in the male having the posterior femur more incrassate.

Rhagovelia distincta var. *proxima* n. var.

Antennæ: 29:16:17:16; female, 32:18:18:16.

Posterior legs: 60:48:25:24; female, 66:49:25:24.

Posterior legs: 50(16):49:8:12; female, 55:63:8:12.

General color black, the legs with a greenish luster; pronotum with narrow transverse, flavous mark on each side of a slight median carina.

Apterous Male. Mesonotum covered by pronotum; metanotum truncate behind. Abdomen with a shiny spot on each tergite. Last segment of venter depressed posteriorly and with a distinct ridge on either side. Posterior femur moderately incrassate, armed at the basal two-fifths with a long, bent, black spine, which is followed by ten to twelve shorter stout spines and preceded by a row of short black teeth. Length, 4.8 mm.; width, 1.4 mm.

Apterous Female. Mesonotum and metanotum slightly emarginate posteriorly. Apices of first, fourth and fifth segments of the connexiva with tufts of fine hair; genital segments also with some fine hair. Connexiva strongly reflexed. Posterior femur slightly incrassate, armed near the middle with a long spine followed by seven or eight small spines. Length, 4.8 mm.; width, 1.4 mm.

Winged Forms. Much as in apterous forms. Posterior femur of male not so much incrassated. Pronotum of male with a slight backward projecting point; female with a backward projecting spine, armed beneath. Length, 5 mm.; width, 1.5 mm.

Holotype, apterous male; allotype, apterous female; paratypes, apterous and winged males and females; morphotypes, winged male and female; all from Boulder creek, Colorado, 1925, by Beamer and Lawson.

Notes. This variety is very near *distincta*, differing in size. It is also near variety *cadyi*, from which it differs by the male being more robust and the female with the connexiva more reflexed.

Rhagovelia distincta var. *valentina* n. var.

Antennæ: 30:16:16:14.

Intermediate legs: 64:41:20:24.

Posterior legs: 53:49:8:11.

General color black, the legs with a greenish luster; pronotum with narrow transverse fulvous mark and yellow spot on each side of a slight median carina. Base of antennæ, prosternum, the trochanters and coxæ entirely or in part, the base of the anterior femur, edge of the first genital segment, and edge of connexivum, yellowish-brown. Clothed with fine gray pubescence. Anterior tibia dilated and hollowed on inner side.

Apterous Male. Mesonotum and part of metanotum covered by pronotum. Last segment of venter depressed posteriorly and with a distinct ridge each side. Posterior femur strongly incrassate, armed at the basal two-fifths with a long, bent, brown spine which is followed by eight or nine shorter stout spines, and preceded by a few minute black spines. Length, 4.5 mm.; width, 1.4 mm.

Apterous Female. Mesonotum and metanotum slightly emarginate behind. Connexivum strongly reflexed and nearly meeting over the fourth and fifth segments; with slightly longer hairs on the apices of first segment. The last

abdominal segment and first genital segment with more hairs, the latter usually with a group of long, stiff, black hairs extending laterally. Last segment of venter darker, and broadly rounded. First genital segment beneath brownish and with a distinct carina. Posterior femur more incrassate than the intermediate, slightly swollen within, and armed at the apical two-fifths with a long, curved, brownish spine, followed by five or six short, stout, black spines. Length, 4.8 mm.; width, 1.5 mm.

Winged Form (Cochise county, Arizona). Much as in apterous forms. Pronotum produced posteriorly in the male into an acute process; in the female produced into a long spiniform process, which is armed at base beneath. Length, 5 mm.; width, 1.6 mm.

Holotype, apterous male, Valentine, Tex., July 23, 1927, R. H. Beamer; allotype apterous female, same data; paratypes, apterous males and females, same data. Also examined winged specimens from Presidio county, Texas, and Cochise county, Arizona, all collected by R. H. Beamer in 1927. All types are in the University of Kansas collection.

This variety is near variety *modesta* n. var. See notes under that form.

Rhagovelia elegans Uhler.

Rhagovelia elegans Uhler. Proc. Zool. Soc. Lond., 1894, p. 216.

Rhagovelia elegans Champion, Biol. Cent.-Am., Het., 2:135, 1898.

Rhagovelia elegans Kirkaldy. Ent., 34:309, 1900.

Antennæ: 28:21:17:14.

This is a reddish-brown species belonging to the group characterized by having the posterior tibia armed with a curved hook. Pronotum fuscous. Posterior femora slightly thickened and armed with about seven long teeth, the two inner ones being longer and thicker. Venter yellow but sometimes dusky and polished. The border of connexivum is brighter yellow, as are the genital segments. Length, 4½-5 mm.; width, 1¾-2 mm.

Notes. Champion says that this species has the tibiæ armed with a long, slender hook at the apex in both sexes as in his *R. insularis* and *uncinata*. He says that this species is distinguished from *R. insularis* by its more elongate form, longer legs, and color of pronotum—these characters are good if both specimens are at hand.

Distribution Records. Grenada.

Rhagovelia femoralis Champion.

Rhagovelia femoralis Champ. Biol. Cent.-Am., Het., 2:138, 1898.

Rhagovelia femoralis Kirkaldy. Ent., 34:308, 1900.

Rhagovelia femoralis Bergroth. Psyche, 21:74, 1914.

Rhagovelia femoralis D. & H. Proc. Biol. Soc. Wash., 40:131, 1927.

Antennæ: 29:15:15:15.

The writer's description:

This is a common black species of moderate size. The antennæ are comparatively short, the middle pair of legs very long, and the posterior pair short. The posterior tibia of male is almost straight, denticulate within and armed with a long tooth at some distance from the apex. Posterior femur is enormously incrassated, armed with two rows of rather long teeth extending from about the basal third to near the apex; one tooth at basal third much

longer. Intermediate tarsus has segment II slightly shorter than III. Length, $4\frac{1}{3}$ mm.; width, $1\frac{1}{2}$ mm.

Notes. Of this species Champion says, "Allied to *R. crassipes*, but much smaller, with relatively shorter hind legs, the armature of both femora and tibiae very different, the antennae shorter, the intermediate tibiae relatively shorter, the metasternum without tubercle in the male, etc. *R. collaris* from the Antilles and South America, one of the types of which is before me, is very like the present species, but it has the anterior tibiae strongly dilated and the hind tibiae sinuous (as in *R. crassipes*) in the male, the connexival margins pale, etc."

Distribution Records. Panama.

Rhagovelia festae Kirkaldy.

Rhagovelia festae Kirkaldy. Bol. Mus. Zoöl. Anat. Comp. Torino, 14:350:4, 1899.

Rhagovelia festae Kirkaldy. Ento., 34:308, 1900.

Antennae: 30:20:15:20.

The writer's description:

This is a small grayish species belonging to the group characterized by the sutured-off pronotum. Antennal segment III is shorter than either II or IV. The anterior femora is a little shorter than the tibiae, and is about four times as long as the tarsi. The posterior femora (of female) are normal in size and unarmed, as are also the tibiae. Length, 2.6 mm.

Distribution Records. Ecuador.

Rhagovelia flavicincta Bueno.

Rhagovelia flavicincta Bueno. Trans. Amer. Ent. Soc., 50:243-252, 1924.

Antennae: Male, 24:11:13:13 and 24:14:15:14; female, 24:14:15:14.

Intermediate legs: Male, 49:35:17:21; female, 50:36:17:22.

Posterior legs: Male, 40:36:4:8; female, 39:37:4:9.

"*Males, Apterous.* Femoral spine long, curved, black-tipped, three-fifths its length from apex, followed apically by five or six smaller ones of nearly equal length; hind femora incrassate, nearly twice as thick as intermediate; posterior tibiae with a straight spur at apex; anterior trochanters with a stout black spine.

"*Females, Apterous.* Pronotum truncate; posterior femora slightly enlarged; femoral spine slender, curved, followed by about five minute spines which grow smaller toward the apex; spine placed two-fifths of its length from tibial joint. No spine on anterior trochanters. Connexiva not quite meeting over last abdominal segment; last connexival angle produced into a stout black spine; first segment of connexivum fringed with closely appressed long black hairs, which have the appearance of a long black spine; connexivum broadly margined with flavous, glabrous."

Length, males, 3.2-3.5 mm.; females, 3.5-3.8 mm.; width, male, 1.1 mm.; female, 1.2 mm.

Type locality is Raleigh, North Carolina. The writer collected this species commonly in Brunswick County, Virginia, and Northampton County, North Carolina. One winged form was taken.

Comparative Notes. This species is very close to *R. obesa* Uhler. The writer examined a male paratype of *flavicincta* and also collected several hundred specimens of this species in both Virginia and North Carolina. The

female of *flavicincta* differs from *obesa* by the more prominent flavous markings, by the larger yellow spots on the pronotum, and by the armature of the posterior femur that consists of one long and four or five distinct shorter spines. The males of this species may be distinguished from *obesa* by a short, distinct, black spine on the outer aspect of the anterior trochanter.

The winged specimen collected in Virginia is similar to *R. obesa*. The tip of the pronotum is produced and curved upward, with the extreme end expanded and very faintly emarginated. The flavous markings are more distinct on this species. The abdomen is not compressed as in the wingless female.

Rhagovelia gigantea Gould.

Rhagovelia gigantea Gould. Trans. Ent. Soc. Am., 21:417, 1928.

"Antennæ: 42:35:24:18.

"Intermediate legs: 74:76:19:22.

"Posterior legs: 74(wide 22):74:17:18.

"*Apterous Male*. General color light brown, covered with short brown pubescence; legs, sides of body, and two basal segments of the antennæ with longer hairs and a few scattered setæ. Head with medium impressed line, crossed by two inverted V's, the posterior one at the posterior margin of the head. Connexiva nearly vertical and about three-fourths the width of dorsum, extending beyond the last abdominal segment to form a long, stout projection equaling in length the genital segments. Venter covered with long hairs of the same color as on the dorsum; venter with a faint carina that terminates in a small round projection on the last abdominal segment.

"Pronotum longer than wide (10:9), rounded behind and covering most of the mesonotum; anterior margin with silvery iridescent band interrupted by the median carina and broadening at the humeral angles. Small yellow scalelike pads project from under the pronotum in the normal position of wings (length 0.8 mm., width 0.2 mm.). The hind margin of the metanotum, the first abdominal segment except the median line, and lateral margins of the second abdominal segment, silvery iridescent.

"Posterior femur greatly incrassate but abruptly narrowed in the apical third, this being marked by a short, stout curved tooth; from this tooth to the base are five stout teeth, diminishing in size toward the base. Numerous minute teeth scattered on femur below larger teeth. Posterior tibia armed with rounded teeth of irregular size, usually consisting of two small teeth between two large ones; at the base of the tibia are several larger teeth; the apex armed with a very minute tooth.

"Genital segments hairy. Claspers long, meeting some distance above the body. Length, 8.4 mm.; width, 2.2 mm."

This species was originally described from one specimen, an apterous male loaned by the U. S. National Museum. In 1928 Doctor Hungerford found eleven unnamed specimens of this species in the Budapest Museum, and through the kindness of Doctor Horvath was able to forward the specimens to the writer. Upon examination the characters of the holotype were found not to be constant in the Budapest Museum specimens. Therefore the following descriptions are added to include the characters of all forms:

Formulæ for all forms:

Antennæ: 28:23:16:14.

Intermediate legs: 47:47:12:14.

Posterior legs: 45:49:11:12.

Apterous Male. The males from the Budapest Museum show that the character of the enormously incrassated posterior femur is not constant, for

three of the six specimens have femora only proportionally larger than the intermediate femora. One character not noted in the original description is the presence of three horns on the supra-anal plate. The tips of the lateral horns are diverging, while the central horn projects backward.

Apterous Female. General color light brown, covered with short, brown pubescence. The connexiva meeting over the last two abdominal segments and projecting out over the first genital segment. Silvery iridescent markings much as in the male, but not so bright. Small scalelike pads appear to be rudimentary wings. The posterior femur not much thicker than the intermediate femur at its widest part; armed with three equally spaced teeth near the middle; several series of minute teeth are also present. Posterior tibia armed with barely visible teeth. Genital segments small, the second somewhat telescoped into the first. On its dorsolateral margin the first genital segment has projections posteriorly, protecting the second. On the ventral surface of the first genital segment a faint carina. Length, 8 mm.; width, 2.1 mm.

Winged Forms. General color much as in the apterous forms. The silvery iridescent markings brighter. Pronotum profusely punctate, such markings extending only into the posterior distal angles of the iridescent area. Pronotum produced posteriorly into an angle, the tip of which is turned slightly upward. Elytra a dark brownish-black, almost black. Veins distinct but not prominent; basal fourth of each elytron and a spot in the closed R (?) cell silvery. Posterior femur of both sexes moderately incrassate, with two large teeth at about the apical third and three smaller teeth below. Trochanter armed with minute teeth. Tibia with several rows of teeth on its posterior surface, the middle row being slightly larger and the teeth increasing in size proximally. Length, 8.4 mm.; width, 2.8 mm.

Holotype, apterous male, from Cincinnati, Colombia, in the U. S. National Museum; allotype and two paratypes, apterous females from Sierra S. Lorenzo, Colombia; morphotypes, winged male and female; paramorphotype, winged male and female; metatype, four apterous males; all collected with the allotype. Allotype and morphotypes in the Hungarian National Museum. Examples also in the University of Kansas collection.

Notes. The scalelike pads are found on all apterous forms and resemble rudimentary wings. They come out from under the metathorax as a true appendage, and are smooth, yellow and waxlike in appearance.

Rhagovelia gregalis Drake & Harris.

Rhagovelia gregalis D. & H. Proc. Biol. Soc. Wash., 40:131, 1927.

Antennæ: "38:23:23:20."

Intermediate legs: Male, "74:48:32:28"; female, "68:46:30:29."

Posterior legs: Male, "55:60:7:10"; female, "54:60:8:11."

The writer's description:

This is a small brownish-black species belonging to the group characterized by the sutured-off pronotum. Posterior margin of pronotum is broadly emarginate; mesonotum is broader than long and truncate behind. Anterior trochanters are unarmed. Posterior femora are armed with one long spine just behind the middle, followed by six to nine shorter spines. Posterior tibiæ are

without a distinct spur at apex. The connexivum of the female is very wide and has the outer edge rounded. Winged forms do not have the pronotum produced posteriorly.

Length, male, 3.06 mm.; female, 3.5 mm.; winged forms, 3.95 mm.; width, male, 1.27 mm.; female, 1.4 mm.; winged forms, 1.54 mm.

Distribution Record. Honduras.

Rhagovelia hirtipes Drake & Harris.

Rhagovelia hirtipes D. & H. Proc. Bio. Soc. Wash., 40:131, 1927.

Antennæ: "30:16:—:—."

Intermediate legs: "61:50:30:28."

Posterior legs: "45:58:8:11."

This species is known only from a winged female, but presumably it is close to *R. gregalis* D. & H. General color is blackish, with the appendages a brownish-black. The pronotum is triangularly produced posteriorly with its apex subtruncate and clothed with long hair. Posterior femora are "clothed within with numerous long yellowish-brown hairs, armed with a long, curved, brown spine at the basal two-thirds, which is preceded by a row of short, stout teeth and followed by four to five very short spines." Length, 4.28 mm.; width, 1.52 mm.

Notes. This species is presumably close to *R. gregalis* D. & H., but certain important characters are as yet unknown and therefore this species has to be left out of the key. Drake and Harris say that "the patch of long hairs at the apex of the pronotum and the short hind femora with their hairy clothing distinguish this species from *R. gregalis*."

Distribution Record. Honduras.

Rhagovelia insularis Champion.

Rhagovelia insularis Champ. Biol. Cent.-Am., Het., 2:135, 1898.

Rhagovelia insularis Kirkaldy. Ent., 34:308, 1900.

Antennæ: 32:22:19:17; winged, 33:24:20:18.

Intermediate legs: 70:50:19:29; winged, 74:56:20:30.

Posterior legs: 64:56:5:12; winged, 68:64:5:12.

This is a moderate-sized, reddish-brown species belonging to the group characterized by a curved hook at the apex of the posterior tibia. The pronotum is rufo-castaneous. Posterior femora armed with five or six long teeth, the first, second and fourth longest, the first and second being a little more distant than the others. Length, 4-4¼ mm.; width of winged forms, 1½-1¾ mm.; apterous forms, 1¼ mm.

Notes. In the University of Kansas collections there are specimens from Brazil and the Island of Trinidad. The proportional characters of the legs and antennæ vary much in the different individuals. The color is also a variable character in many instances.

Specimens from Panama, Trinidad and Brazil were compared by Doctor Hungerford with *R. insularis* Champ. types in the British Museum. Doctor Hungerford believes the specimen from Panama to be *insularis* and probably the other specimens, also, although he says they are darker.

The Panama specimen (No. 1) is a winged male measuring 5.6 mm. in length, 1.9 mm. in width, and has the spines on the posterior femur as in the

type specimen, *i. e.*, 1st, 2d and 4th of equal size and longer than 3. The wingless male (No. 2) from Trinidad is 4.7 mm. in length, 1.3 mm. in width, and the armature of the posterior femur is as in No. 1. A winged male from Brazil (No. 3) is 5.1 mm. in length, 1.7 mm. in width, and has spines 1 and 2 equal and longest, spines 3 and 4 equal and somewhat shorter, and spines 5 and 6 equal and quite small. A wingless female from Brazil (No. 4) has spines 1 and 2 longest with 2 slightly longer than 1, 3 and 4 equal, and spines 5 and 6 equal and small. The measurements of No. 4 are the same as No. 2. All other specimens from Brazil have the arrangement of the spines as in No. 3.

It can be seen from the above that there is a wide variation in armature and, as previously remarked, a variation in color. However, the claspers and genitalia of specimens are the same in every detail and therefore these thirteen specimens are called one species—*R. insularis* Champ., based on comparisons by Doctor Hungerford.

Distribution Records. Trinidad, Panama, Brazil, Colombia.

Rhagovelia knighti Drake & Harris.

Rhagovelia knighti D. & H. Proc. Biol. Soc. Wash., 40:131, 1927.

Antennæ: "26:16:18:15."

Intermediate legs: "56:41:21:26."

Posterior legs: "Male, 42:39:6:11; female, 41:45:5:10."

This is a small, blackish species, closely related to *R. obesa* Uhler. The anterior trochanters of the male armed with a dark spine; posterior femur is rather strongly incrassated, armed with a row of short teeth on the basal two-fifths and from there to apex with a row of eight or nine longer spines that decrease in size distally, and also a row of smaller teeth. Pronotum of female is broadly rounded on its posterior margin; connexivum has a tuft of brown hairs at apex and is faintly produced. The posterior femora of the female is armed with a longer spine at the apical two-fifths, and from there to apex with three or four very short spines. Length, 3.2 mm.; width, 1.2 mm.

Notes. This species is very similar in form, size, general color, and markings to *R. obesa* Uhler. The males of the two species are so similar that Drake and Harris could give no good character by which to separate them. They say the female is easily recognized by the rounded posterior margins of the pronotum and by having the apical angle of the connexiva only slightly produced. Whether this species should be grouped in the key with *obesa* cannot be determined until a winged specimen has been identified. An examination of the genitalia of the two species might prove them to be the same.

Distribution Record. Missouri.

Rhagovelia longipes n. sp.

Antennæ: Male, 24:12:16:17; female, 24:11:16:15.

Intermediate legs: 67:41:27:20; 64:40:24:21.

Posterior legs: 40:64:3:6; 40:58:3:6.

General color grayish-black, clothed with brown pubescence and a few long hairs on the sides of the body, legs, and the two basal segments of the antennæ. Base of first antennal segment brown; venter bluish-black, except the median portion of the last abdominal segment, which is shining black. Pronotum with

a slight median carina and rounded posteriorly. Elytra brown. Posterior tibia unarmed at apex.

Winged Male. Body compressed vertically. Posterior femur not so large as base of the intermediate femur, and unarmed. Intermediate leg and posterior tibia very long.

Winged Female. Body compressed as in the male. Posterior femora unarmed and not incrassated.

Length of body (tips of wings broken), 3.75 mm.; width, 1.56 mm.

Holotype, winged male; allotype, winged female; paratype, winged male; all from Tena, Ecuador, near Oriente, March 29, 1923, collected by F. X. Williams. Types are in the University of Kansas collection.

Comparative Notes. This species is very close to the other new species from Ecuador that are characterized by the small pronotum which is sutured off from the mesonotum. Even though only the winged forms of this species are known, it probably goes in the *tenuipes-festæ* group. In addition to the pronotal character, this species is distinguished from all other related species by its proportional measurements, by its long posterior tibiæ, by its long intermediate legs, and by the unarmed posterior femora.

Rhagovelia lucida n. sp.

Antennæ: 24:12:15:13.

Intermediate legs: 52:41:21:23.

Posterior legs: 38:40:4:10.

Color a brownish-black, covered with golden brown pubescence. Pronotal band indistinct, but with a yellow spot each side of center. Pronotum short (9:16) and obtusely rounded behind; mesonotum broadly rounded and broader than long (16:5); metanotum nearly covered. Antennal segment one curved and thickened apically; segment three widened and club-shaped. Connexivum not reflexed and of the same color throughout. Base of antennæ, base of anterior and posterior femora (slight), all coxæ, and the anterior and posterior trochanters, reddish-brown. Venter of slightly darker color. Anterior trochanter unarmed; posterior tibia with a short spur at apex.

Apterous Male. Genital segments large. Posterior femora slightly incrassated and armed at middle with a moderately long spine, followed by about five spines apically and a row of distinct spines basally.

Length, 3.9 mm.; width, 1.2 mm.

Type, apterous male; Theresopolis, Rio de Janeiro, Brazil, September 8, 1923, G. L. R. Hancock. Type is in the British Museum.

This species is somewhat like *R. trista* n. sp. in the structure of the pronotum but differs in the male clasps, the proportional measurements and the armature of the posterior femora.

Rhagovelia obesa Uhler.

Rhagovelia obesa Uhler. Proc. Bost. Soc. Nat. Hist., 19:4434, 1872.

Rhagovelia obesa Uhler. Kingsley Nat. Hist., 2:249-276, 1884.

Rhagovelia obesa Uhler. Ck. List, Hem., Brooklyn Ent. Soc., 1886.

Rhagovelia obesa Uhler. Proc. Zool. Soc. Lond., p. 215, 1894.

Rhagovelia obesa Champ. Biol. Cent.-Am., Het., 2:135, 1898.

Rhagovelia obesa Kirkaldy. Ent., 34:308, 1906.

- Rhagovelia obesa* Bueno. Can. Ent., 39:2:61-64, 1907.
Rhagovelia obesa Van Duzee. Ck. List Hemi., N. Y. Ent. Soc., 1916.
Rhagovelia obesa Van Duzee. Cat. Hemi. N. A., 1917.
Rhagovelia obesa Hungerford. Kan. Uni. Sci. Bul., XI, Dec., 1919.
Rhagovelia obesa Parshley. S. Dak. St. Col. Tech. Bul. 2, 1922.
Rhagovelia obesa Bueno. In Hemi. Conn. Geo. & Nat. Hist. Survey, Bul. 34, p. 418, 1923.
Rhagovelia obesa Bueno. Trans. Am. Ent. Soc., 50:250, 1925.
Rhagovelia obesa Hussey. Jour. N. Y. Ent. Soc., 33:June, 1925.
Rhagovelia obesa Bueno. Cornell Uni., Memoir 101, 1926.
Rhagovelia obesa Drake & Harris. Proc. Bio. Soc. Wash., 40:131, 1927.

"Allied to *R. collaris* Mayr (Burm.), but differs in the colors, in the more contracted abdomen, with its acutely produced posterior tips of the connexivum, and in the absence of dense long hairs at the tip of venter in the same sex.

"Brownish, or bronze-black; the underside bluish, sericeous; when very mature less polished, but more densely powdered with bluish, or cinerous bloom. Head black, velvety, the front almost truncated, cinerous, with an impressed longitudinal line running almost to the base, a few long hairs about the sides and above; the cranium a little elevated on the middle, extending back in the form of a triangle; the base of the occiput transversely a little carinately elevated. Labrum and lateral lobes yellowish, or rufo-piceous; rostrum black, reaching to the tips of the anterior coxæ. Eyes round, brown. Antennæ black, excepting the base of the basal joint, less hairy than in *R. collaris*; the basal joint stoutest, curved, about twice as long as the second joint, the second subequal to the third, the fourth decidedly shorter than the third. Thorax obese, the pronotum velvety blackish, sparingly clothed about the sides with fine golden pubescence; collum with an orange band which is interrupted in the middle; middle line faintly carinated; the tip of pronotum produced at tip, curved upwards, its extreme end expanded, emarginated, and each process granulated; the humeri prominent in the winged individuals, in the unwinged it is obliquely rounded. Pectus bluish, sericeous, each side of prosternum broadly orange. Coxæ, trochanters, and usually the base of femora yellow; the femora bronzed a bluish-black, minutely hoary pubescent; the tibiæ and tarsi duller black; posterior femora of the males stouter than of the females, in both with a yellow, black-tipped, curved spur beyond the middle and from it to near the tip series of minute teeth. Abdomen moderately compressed (very strongly compressed in unwinged females), minutely sericeous, pubescent, excepting on the middle of tergum, which is bald, shining black; the raised upper edge of the connexivum orange, in the female the posterior tips produced into long slender spines. The middle of the antegenital ventral segment of the male quadrately, broadly flattened, each side of which a little elevated. Basal genital segment of the female broadly black on the middle. The cerci of the male are long, slender curved hairy processes.

"Length, $3\frac{1}{2}$ to 4 mm.; breadth of pronotum, $1\frac{3}{4}$ mm."

Notes. This is a very common species of wide distribution and is related to, or identical with, several recently described species, including *knighti* D. & H., *flavicincta* Bueno, and *arctoa* Bueno. However, the genitalia of the last two named have been examined and there appear to be slight differences.

Distribution Records. Ontario, Maine, Massachusetts, Vermont, New York, New Jersey, Pennsylvania, Maryland, District of Columbia, Virginia, North Carolina, Florida, South Carolina, Ohio, Michigan, Tennessee, Utah, California, Colorado, and Illinois.

Rhagovelia obscura n. sp.

Antennæ: 27:16:19:15.

Intermediate legs: 58:38:23:23.

Posterior legs: 48:43:6:10.

General color grayish-black, clothed with brown pubescence and with long hairs on the sides of body, legs, and two basal segments of antennæ. Dorsum of abdomen and edge of connexiva glabrous and brown. Venter bluish-gray, except the median portion of last abdominal and the genital segments. Pronotum sutured off from mesonotum and with a dark brown spot anteriorly. Mesonotum and metanotum cut off squarely on posterior margin. Long hairs on acetabula of posterior legs resembling a spine. Posterior tibia armed with straight spur. Anterior tibia with a slight groove near apex.

Apterous Male. Abdomen gradually tapering. Genital segments large. Posterior femur slightly incrassate, straight on anterior margin, and armed with one long, curved spine at about the center, followed by about eight short teeth. Posterior tibia with serrate teeth of equal size throughout.

Apterous Female. Abdomen broad as in the male. Posterior femur slightly incrassate, armed with one long and five short teeth. Genital segments small.

Length, 3.5-3.75 mm.; width, 1.2-1.4 mm.

Holotype, apterous male; allotype, apterous female; paratypes, apterous males and females; all collected by F. X. Williams at Naranjapata, Ecuador, December 14, 1923. Types are in the collection of the University of Kansas.

Notes. This species is near *R. confusa* n. sp., but differing from it in the armature of the posterior tibia, the anterior tibia with a groove, and the genitalia. The proportional measurements of the specimens included in this species varied, but the numbers used are the averages.

Rhagovelia oriander Parshley.

Rhagovelia oriander Parsh. S. Dak. St. Col. Tech. Bul. 2, p. 19, 1922.

Rhagovelia oriander Bueno. In Conn. Geo. & Nat. Hist. Survey, Bul. 34, p. 418, 1923.

Rhagovelia oriander D. & H. Proc. Bio. Soc. Wash., 40:131, 1927.

Rhagovelia oriander Bueno. Trans. Am. Ent. Soc., 50:250, 1925.

Antennæ: 30:20:20:18.

Intermediate legs: 56:44:24:30.

Posterior legs: 48:46:5:11.

This is a moderate-sized, dark brown species that is characterized by the pronotum being produced in the apterous forms. Parshley gives the proportion of the antennal segments as 18:10:10:9 and also says that the second and third segments of the middle tarsi are equal in length. In the male the pronotum is moderately developed, and extending angulately back over the metanotum; while in the female the pronotum is greatly developed and continued posteriorly in a knobbed and elevated process. The posterior femora of the male is strongly incrassate, being armed at the middle with a long curved spine followed by eight smaller spines; also there is a row of small teeth just below this row and extending the full length of the femur. The posterior femora of the female is but slightly thickened and armed with one long and about seven short spines. The posterior tibia of the male is serrately denticulate within, while the tibia of the female is unarmed. Body of the female strongly compressed; connexivum strongly reflexed against body

and scarcely, if at all, meeting over the last abdominal segment. In the winged forms the pronotum is much as in the apterous forms.

Length, 3.4-3.9 mm.; width, 1.1-1.6 mm.

Distribution Records. South Dakota, Ohio, Iowa, Minnesota, and Kansas.

Rhagovelia plumbea Uhler.

Rhagovelia plumbea Uhler. Proc. Zool. Soc. Lond., p. 217, 1894.

Rhagovelia plumbea Kirkaldy. Ent., 34:308, 1900.

Trochopus marinus Carpenter. Ent. Mo. Mag., 24:78, 1898.

Rhagovelia plumbea Hungerford. Kan. Uni. Sci. Bul., XI, Dec., 1919.

Rhagovelia plumbea Bueno. In Conn. Geo. & Nat. Hist. Survey, Bul. 34, p. 418, 1923.

Rhagovelia plumbea D. & H. Proc. Biol. Soc. Wash., 40:131, 1927.

Antennæ: 30:19:23:18.

This is a small bluish-black species belonging to the group characterized by the sutured-off pronotum. The posterior femur is unarmed. Length, male, 2½ mm.; female, 3¼ mm.; width, male, 1 mm.; female, 1¼ mm.

Notes. In 1898 Carpenter described *Trochopus marinus* and in 1900 Kirkaldy put it in synonymy with *R. plumbea*. The original descriptions do not agree in many of the essential characters. For instance, Carpenter said the posterior femora were armed with three spines, while Uhler gave the posterior femora as unarmed. Antennal proportions are also different.

This is one of the species that lives on the salt water of bays.

Distribution Records. Florida, Grenada, St. Vincent, and Jamaica.

Rhagovelia regalis Drake & Harris.

Rhagovelia regalis D. & H. Proc. Bio. Soc. Wash., 40:131, 1927.

Antennæ: "34:20:20:15."

Intermediate legs: "65:44:26:26."

Posterior legs: "51:51:4:7."

This is a moderately small, black species, belonging to the group characterized by a very short pronotum. The posterior femora are slightly incrassate and about normal in the female, armed with a long spine at the middle and followed apically by seven to ten shorter spines. Hind tibia of male has a slender spur at apex. Connexivum of the female is broad, abruptly rounded and clothed at apex with longer hairs.

Length, 2.6-3 mm.; width, 1.2-1.4 mm.

Notes. Of this species Drake & Harris say, "The short pronotum, the formulæ of the antennæ and legs, and the shape of the connexivum distinguish *regalis* from related species."

Distribution Record. Honduras.

Rhagovelia relictæ n. sp.

Antennæ: 22:14:—:—.

Intermediate legs: 50:34:13:22.

Posterior legs: 39:36:4:12.

General color brownish-black, clothed with golden pubescence. Genital segments, antennæ and legs with longer hairs and a few scattered setæ. Pronotum with bright yellow-brown transverse band; broader than long (15:13) and broadly rounded behind. Mesonotum completely hidden; metanotum small. Base of antennæ, base of anterior and posterior femora, all coxæ, an-

terior and posterior trochanters, pronotal band and edge of connexivum, light brown. Venter nearly black and with a slight median carina. Anterior trochanters unarmed; posterior tibia with long stout spur at apex.

Apterous Male. Connexivum broad and not reflexed. Posterior femora strongly incrassate and armed with two irregular rows of long teeth varying in size, the first two on the upper row being the longest. Posterior tibia slightly sinuate and armed at apical one-fifth by a long spine, preceded by a single row of stout teeth to base, and followed by two or three small teeth; apex armed with a stout spur.

Apterous Female. Connexivum semivertical. Posterior femur slightly incrassate and armed with one long tooth near the middle and eight to ten apically. Posterior tibia straight and without prominent tooth.

Length, 3.7-4 mm.; width, 1.3 mm.

Holotype, apterous male; allotype, apterous female; both are from Campinas, Estado do Sao Paulo, Brazil. Collected by F. X. Williams, March 10, 1924. Types are in the University of Kansas collection.

Doctor Hungerford compared these specimens with type and general material in the British Museum, the Berlin Museum, and the Museum of Vienna, and found them to be different from types located in these collections. This species is perhaps similar to *R. femoralis* Champ., but differs in the armature of the posterior femur. It is somewhat like *R. robusta* n. sp., but differs in color, size, armature of the posterior leg, and the claspers. The claspers are somewhat like those of *R. sinuata* n. sp., but the specimens differ in size, proportional measurements, and the armature of the posterior legs.

Rhagovelia rivale Bueno.

Rhagovelia rivale Bueno. Trans. Am. Ent. Soc., 50:243, 1924.

Antennæ: "15:10:10:10."

Intermediate legs: "Male, 33:24:12:12; female, 33:26:15:13."

Posterior legs: "Male, —:22:3:5."

This is a moderate-sized, black species, in which the winged forms have the pronotum produced posteriorly, the male into an angulate, upturned tip and the female into a long turned-up knob of equal size throughout. The posterior femur of the apterous male is somewhat thickened, and armed near the middle with a long spine followed by four or five short ones. The posterior femur of the female is about equal in size to the intermediate, and is armed as in the male. The connexiva of the female are reflexed, but not to meet above the abdomen.

Length, apterous male, 3.3-3.6 mm.; apterous female, 4.3-4.6 mm.; males winged, 4 mm.; females winged, 4.45 mm.; width, all forms, 1.3-1.65 mm.

Notes. I have examined the types and miscellaneous new material from various parts of Kansas. Several of the structures I found to be different from Bueno's description. For instance, in his key Bueno says *rivale* is without a spine on its anterior trochanter; yet in his description he says with a "Stout black spine on the outer aspect." The types, male and female, do not have the anterior trochanters armed. He does not mention the armature of the posterior femur of the female, nor does he mention the proportional measure-

ments of the posterior legs of the female. Furthermore, his proportional measurements differ from what I find—

Antennæ: 18:10:10:8.

Intermediate legs: Male, 33:24:12:12; female, 40:28:15:14.

Posterior legs: Male, 24:24:4:7; female, 30:30:4:7.

Distribution Records. Kansas and Colorado. This species is widely distributed over Kansas, specimens having been taken from seven widely separated counties.

Rhagovelia robusta n. sp.

Antennæ: Male, 24:15:15:15; female, 24:15:16:15.

Intermediate legs: 56:40:16:23; 51:38:16:23.

Posterior legs: 48:44:3:8; 44:40:3:8.

General color brownish-black, clothed with yellow pubescence; legs and antennæ light brown. Sides of body, legs, antennæ and genital segments with longer hairs and a few scattered setæ. Head with median impressed line crossed by a V-shaped suture. Pronotum with a narrow transverse brown band; broader than long (9:8), and broadly rounding behind. Connexivum broad but not reflexed, and with margin of light brown. Acetabula, coxæ, anterior and posterior trochanters, and intermediate trochanters in part, base of antennæ, anterior femur at base, and the basal and lower portion of the posterior femur light brown. Anterior trochanters unarmed; posterior tibia armed with short spur at apex.

Apterous Male. Metanotum slightly emarginate behind and mesonotum covered by pronotum. Genital segments longer than sixth abdominal segment (4:3). Last ventral abdominal segment flattened apically. Posterior femur greatly incrassate and armed with two irregular rows of long teeth of varying size and no definite arrangement. Posterior trochanter armed on inner side with several small teeth. Posterior tibia armed with an irregular row of teeth with one stout tooth near the apex and a stout spur at apex.

Apterous Female. Similar to the male. Posterior femur moderately incrassate and armed with a series of about eight spines. Posterior tibia with a row of regular serrate teeth. Genital segments small.

Length, 4.4 mm.; width, 1.5 mm.

Holotype, apterous male; allotype, apterous female; paratypes, apterous males and females; all from Villarrica, Paraguay. Collected by Fran. Schade in 1921. All types are in the University of Kansas collection.

Notes. This is the first species of *Rhagovelia* described from this portion of the world, *i. e.*, the east central part of South America. This species is not strikingly different from other South American forms, and yet has some unusual characters. The claspers and genitalia of the male are different, and the color is unusual.

Rhagovelia salina (Champ.).

Trochopus salinus Champion. Biol. Cent.-Am., Het., 2:140, 1898.

Rhagovelia salina Kirkaldy. Ent., 34:308, 1900.

Rhagovelia salina Bueno. In Conn. Geo. & Nat. Hist. Survey, Bul. 34, p. 418, 1923.

Rhagovelia salina D. & H. Proc. Biol. Soc. Wash., 40:131, 1927.

This is a small grayish-black species belonging to the group characterized by the sutured-off pronotum. The connexivum is raised and broadly expanded.

The legs are long and with tarsal segment II longer than III. In the males the anterior trochanter is armed with a long acute outwardly directed tooth. The posterior femora are slightly incrassate in the male and armed with one long spine at the middle and row of minute teeth; in the female only feebly incrassated and unarmed or with one or two minute teeth.

Length, 3.2-3.8 mm.; width, 1.4-1.8 mm.

Notes. Four female specimens of this species from Jamaica, B. W. I., were collected by L. C. Perkins, December 24, 1928. This is an unusual-shaped specimen with the connexiva broadly rounded. The body is mottled with a gray powder that comes off readily. The proportional measurements, the shape, and the connexiva separate it from all other species. Proportional measurements are as follows:

Antennæ: 20:12:16:12.

Intermediate legs: 52:41:24:20.

Posterior legs: 29:42:3:8.

Distribution records. Panama, Jamaica.

Rhagovelia sinuata n. sp.

Antennæ: 40:25:27:22.

Intermediate legs: Male, 90:75:23:33; female, 85:68:20:31.

Posterior legs: 85(32):70:6:16; 70:66:6:16.

General color dark brown and clothed with short yellowish pubescence, with longer hairs on the sides of body and legs. Legs and two basal segments of antennæ with a few scattered setæ. Head with usual impressed lines. Pronotum sparsely punctured and of the same color throughout. Connexivum broad, but not reflexed and similar in both sexes. Venter slightly darker brown and with a trace of a longitudinal carina. Sixth ventral abdominal segment excavated each side of middle. Tarsi and apical segments of antennæ darker, almost black. Rostrum black and its tip extending beyond the coxal cavities. Anterior trochanter unarmed; pronotal band almost indistinct with no spots.

Apterous Male. Pronotum obtusely rounded, wider than long (11:8). Last abdominal segment and genital segments with long hairs. Posterior femora greatly incrassate and armed with two rows of spines, the lower row very small in the apical third; first spine of upper row large, followed by four short spines, a very large, stout spine, and a series of shorter spines. Posterior tibia strongly sinuate and armed with two rows of teeth with a large spur at apex. Posterior trochanters armed with several knoblike teeth.

Apterous Female. Venter slightly carinated with the last abdominal segment notched in center apically. Posterior femur incrassate in middle, and armed just beyond the middle with a long spine followed by seven small ones. Posterior tibia with fewer teeth than male, especially near the apex; blunt tooth at apex.

Winged Female. Posterior angle of pronotum about 90 degrees, not elevated at tip. Elytra brownish-black, nervures distinct. Posterior femur moderately incrassate and armed in same manner as apterous female. Posterior tibia slightly but distinctly sinuate and armed as in male. Posterior trochanter with denticulations.

Length, winged female, 5.2 mm.; apterous forms, 4.5 mm.; width, winged female, 1.6 mm.; apterous forms, 1.4 mm.

Holotype, apterous male; allotype, apterous female; morphotype, winged female; paratypes, apterous males and females; all from Banos, Ecuador, collected by F. X. Williams in 1923. Types are in the University of Kansas collection.

Notes. Included in this species are two groups—a lighter reddish-brown form and a brown form. The specimens were compared with type and general material in the European Museum and were found to be distinct. Doctor Hungerford says the reddish specimens (28, 300) are near, but not, *R. fieberi* Guer. type in the Vienna Museum. This species is possibly near *R. femoralis* Champion, but differing in having the posterior tibia sinuate.

Rhagovelia spinigera Champion.

Rhagovelia spinigera Champion. Bio. Cent.-Am., Het., 2:137, 1898.

Rhagovelia spinigera Kirkaldy. Ent., 34:305, 1900.

This is a moderate-sized, brownish-black species, of which only the winged female is known. The pronotum is produced posteriorly into a long, semierect spiniform process. The legs are comparatively slender, with the posterior pair short. The intermediate femur is "curved in front and concave within, abruptly compressed at the middle." Posterior femur is slightly thickened and is armed with a long spine at the middle, followed by 5 or 6 shorter teeth apically. Posterior tibia is armed at apex with a straight spur. The intermediate tarsus has segment two shorter than three. Length, 4.5 mm.; width, 1.6 mm.

Notes. There are two winged females in the University of Kansas collection bearing the label "San José, C. R., January, 1905, P. Biolley, collector." In addition to the above characters I find the posterior femora to have a second row of minute teeth. The first genital segment has a carina beneath that broadens apically. The intermediate coxæ are dark brown. Formulæ:

Antennæ: 34:20:19:18.

Intermediate legs: 68:46:22:32.

Posterior legs: 56(12):60:7:14.

Pronotum wide 60, long 76 (including process).

The above specimens were compared by Doctor Hungerford in 1928 with the types in the British Museum and found to be the same species.

Distribution Records. Guatemala, Costa Rica.

Rhagovelia spinosa n. sp.

Antennæ: 20:11:12:10.

Intermediate legs: 36:27:14:18.

Posterior legs: 26:31:3:7.

Apterous Male. General color black, densely clothed with light brown pubescence and with numerous long hairs on body, legs, and antennæ. Base of first antennal segment, anterior coxa and trochanter, posterior trochanter in part, and a spot near the base of posterior femur, brown. Venter gray with lighter pubescence. Pronotum sutured off from mesonotum. Posterior tibia unarmed. Hairs on the posterior acetabula forming a large, stout, spinelike group. Anterior trochanter armed with a very long prominent hair.

Abdomen terminating ventrally in a large, stout, slightly curved spine. Posterior femur slightly incrassate, being about equal with intermediate femur

at base; armed at apical third by one spine, followed by about three minute teeth. Genital segments large. Length, 2.6 mm.; width, 1 mm.

Holotype, apterous male; paratype, apterous male; both from Tena, near Oriente, Ecuador, collected by F. X. Williams, March 29 to April 10, 1923. Types are in the University of Kansas collection.

Notes. This species belongs in the group characterized by the sutured-off pronotum. It may be distinguished from other species of the group by the proportional measurements, the very hairy body, and the spine on the posterior edge of the abdomen. This species is related to *festæ* Kirkaldy, but differs in the proportional measurements of the antennæ, in having the posterior femur armed, and in the spine on the underside of the abdomen.

Rhagovelia tayloriella Kirkaldy.

Rhagovelia tayloriella Kirk. Ent., 33:72, 1900.

Rhagovelia tayloriella Kirk. Ent., 34:308, 1900.

Antennæ: 30:20:18:17.

Intermediate legs: 42:30:14:16.

Posterior legs: 30:27:3:6.

This is a large black species belonging to the *collaris* group that is characterized by the anterior tibia being dilated and excavated beneath. The posterior femur of the males is strongly incrassate and armed with ten or eleven strong teeth from its center to apex; tibia and trochanter are denticulate. The posterior femur of the female is moderately incrassate and armed with one large and two or three small teeth. The connexiva are semivertical and much narrowed in from the base at first, afterwards continuing subparallel. In the winged forms the male has the pronotum produced posteriorly into a short acute porrect spine, while in the female it is produced into a long stout process, that "arises at an angle of 45 degrees, curves around near its apex and is then deflected slightly downwards."

Length, 5 mm.

Notes. This species is related to *R. collaris* (Burm.), but may be separated from that species by its straight posterior tibia. *Tayloriella* may be distinguished from the brighter marked *collaris* var. *pulchra* n. var. by the comparative sizes of the antennal segments.

Distribution Record. Jamaica.

Rhagovelia tenuipes Champion.

Rhagovelia tenuipes Champion. Biol. Cent.-Am., Het., 2:137, 1898.

Rhagovelia tenuipes Kirkaldy. Ento., 34:308, 1900.

Rhagovelia tenuipes D. & H. Proc. Biol. Soc. Wash., 40:131, 1927.

Antennæ: 34:18:18:16.

This is a moderate-sized, black species belonging to the group characterized by the sutured-off pronotum. The legs are very long and slender, with the posterior tibia unarmed at its apex. The intermediate leg has tarsal segment II much longer than III. The posterior femur is normal in thickness and armed with a long acute spine at the middle, followed by a row of very short teeth.

Length, about 4 mm., probably.

Distribution Record. Mexico (Tabasco).

Rhagovelia trista n. sp.

Antennæ: 32:18:20:18.

Intermediate legs: 68:48:23:28.

Posterior legs: 56:42:3:10.

General color black, covered with brownish pubescence, and with longer hairs on sides of body, legs, and the two basal segments of the antennæ. Edge of connexivum pubescent, dorsum of abdomen nearly glabrous. Pronotum short (8 wide, 4 long) and obtusely rounded behind; mesonotum truncate behind (8 wide, 3 long); metanotum broadly truncate behind, one-third as long as mesonotum. Base of antennæ, anterior and posterior trochanters in part, and the base of the anterior femora, flavous to dark yellow. Pronotum with a pale band and the usual spots each side of the middle. A row of punctures on and parallel to the anterior margin of pronotum resemble a suture, giving the appearance of a minute segment. Anterior trochanters unarmed. Venter grayish-black; last abdominal segment black.

Apterous Male. Posterior femora incrassated and having a long spine at the basal third, followed by three distinct, sharp teeth and four smaller ones. Posterior tibiæ somewhat sinuous, armed with teeth decreasing in size apically; apex with a sharp spur. Connexiva broad, slightly reflexed.

Apterous Female. Much as in the male. Connexivum nearly vertical. Posterior femur (as in male) armed with one long, sharp spine, followed by three somewhat smaller but still distinct spines, and then four minute teeth. Genital segments small and bluntly rounded.

Length, male, 3.3 mm.; female, 3.6 mm.; width, 1-1.2 mm.

Holotype, apterous male; allotype, apterous female; paratypes, apterous males and females; all collected at Mera, Ecuador, by F. X. Williams, in 1923. Also specimens labeled from Ecuador, and from Banos, Ecuador, by F. X. Williams. Types are in the University of Kansas collection.

Comparative Notes. This species was compared with type and general material in the British Museum, in the Museum of Vienna, and in the Berlin Museum. No similar specimens were found.

This species is not similar to any of the known species. It is somewhat like *R. williamsi* n. sp., but differing from it in color markings, armature of the posterior femur, and some in the structure of the pronotum.

Rhagovelia trailii (White).

Neovelgia trailii White. Jour. Linn. Soc. Lond., Zoöl., 14:487, 1879.

Rhagovelia trailii Kirkaldy. Ent., 34:308, 1900.

The original description of this species is as follows:

"Nigro-brunea, pubescentia confere concolori vestita, capite, antennis, pedibus, pronoto postico abdominisque lateribus parce nigro-setulosis; pronoto antice, prostethio, connexivo, ventre ad medium, antennarum articulo primo ad basin, coxis, trochanteribus, femorum anticorum macula et vitta subtus, femorum posticorum basi et spinis ad basin flavido-fulvis; pronoti carina centrali subelevata plus minus, præcique antrosum, rufo-fulva. Male long. 4, lat. 1½ millim.

"Hab. Brasiliam borealem. (Manaos, August, 1874, 'at light,' J. W. H. Trail.)"

Doctor Hungerford agrees with Kirkaldy that this species is a *Rhagovelia*. While examining types in the British Museum, Doctor Hungerford found that none of the specimens from the University of Kansas collection belongs to this species.

Rhagovelia uncinata Champion.

Rhagovelia uncinata Champ. Biol. Cent.-Am., Het., 2:135, 1898.

Rhagovelia uncinata Kirkaldy. Ento., 34:308, 1900.

Antennæ: 30:20:18:16.

This is a moderately large, reddish-black species belonging to the group that is characterized by having the posterior tibia armed with a curved hook. The terminal genital segment of both sexes is produced into a sharp spine at apex. The intermediate tarsi has segment III much longer than II. "Posterior femur (of male) moderately incrassate, armed with seven or eight acute, curved teeth, the two inner ones much longer than the others and widely separated (one at the middle and one at about the basal third)." Posterior femora of the female are less incrassate than the male and armed similarly.

Length, 4.5-1 mm.; width of winged forms, 1.5-2 mm.; of apterous forms, 1.25-1.5 mm.

Distribution Record. Panama.

Rhagovelia varipes Champion.

Rhagovelia varipes Champ. Biol. Cent.-Am., Het., 2:133, 1898.

Rhagovelia varipes Kirkaldy. Ent., 34:308, 1900.

Antennæ: 30:16:—:—.

This is a large black species that Champion describes in part as follows: "Pronotum abbreviated and rounded behind, with indications of a median ridge anteriorly. Abdomen gradually narrowing from the base; the first and second ventral segments strongly longitudinally carinate down the middle, the sixth segment deeply triangularly emarginate at the apex, leaving the first genital segment exposed. Anterior tibiæ slightly hollowed at the apex beneath. Intermediate tarsi with the second joint slightly longer than the third. Posterior femora greatly incrassate, armed with numerous teeth, which are placed in two rows along the center, those of the upper row unequal in length, there being three longer teeth towards the middle and two beyond it; posterior tibiæ denticulate and strongly sinuous, the teeth along the apical third slightly longer than the others, the apex unarmed."

Length, nearly 6 mm.; width, 1.75 mm.

Distribution Record. Mexico.

• *Rhagovelia vivida* (White).

Velia vivida White, B. Jl. Linn. Soc., Zool., 14:486.

Dr. H. B. Hungerford, after a careful study of White's type of *Velia vivida* in the British Museum, finds it to belong to the genus *Rhagovelia*. The type is a very large female (8 mm.) from Nicaragua. Hungerford's notes on the specimen are as follows:

"Is dark gray in color with lighter gray patches on sides of thorax and abdomen; yellow band gray-margined on collar of thorax. Margin of connexi-

vum yellow—not spinous pointed. Shoulders with stout, erect, sharp, somewhat backwardly directed elevations. Hind femur with two stout spines, femur not greatly incrassate.”

Rhagovelia whitei (Breddin).

Neovelia whitei Breddin. Jahrb. Nat. Ver. zu Magee., p. 14, 1898.

Rhagovelia whitei Kirkaldy. Ento., 34:308, 1900.

“*Male, Apterous.* Antennarum articulus primus secundo distincte longior (5:3), articulo secundo apicalibus duobus, gracilibus robustiore. Pronoto carina mediana subelevata destituto, medico convexo, pone humeros late-rotundato producto et retrorsum fere acetabulorum intermediorum marginem apicalem æquante; pronoto toto latitudine humerali quinta vel quarta fere parte brevior. Prothoracis marginibus omnino deletis pronotum paulatim atque indistincte in convexitatem acetabulariam transit; prostethio postico supra coxæ linea intramarginali curvata punctorum impressorum subtilium fuscorum notato. Spinulis dimidii apicalis femorum posticorum parvis, omnibus fere æquilongis, sub apicem extus spinula unica maiore.

“*Nigra*, opaca, ubique pilis brevibus, adpressis, sordide ferruginescentibus dense vestita; femoribus posticis subtus tibiisque omnibus longius pilosis; capite supra, antennarumque articulis basalibus setis nonnullis suberectis instructis, femoribus anticis subtus serie eiusmodi setarum erectarum et extus et intus, femoribus intermediis serie unica setarum semicumbentium munitis. Capite (verticis basi excepta), antennarum articuli primi fere dimidio basali, rostro (apice excepto), pronoti margine late antice, pectore (sternis meso- et metastethii his sordide castaneis, exceptis), coxis et trochanteribus omnibus, connexivi margine, segmenti ventralis sexti medio late annuloque basali segmenti genitalis ferrugineo-luteis. Trochanteribus anterioribus apice annulo, intus obsoleto, nigro. Femoribus omnibus (Intermediis sordide) ferruginescenti-luteis, anticorum vitta lata dimidii apicalis supra atque extus, intermediorum parte omni superiore (vel posteriore), posticorum macula magna, submicante partis superioris atque anterioris, basin non attingente, nigris. Tibiis ab infero visis sordide ferruginescentibus, a supero visis nigris vel fuscis.

“Long., $4\frac{3}{4}$ mm.

“‘Lagoa santa’ (coll. Instituti Zoologici Halensis),” South America.

Rhagovelia williamsi n. sp.

Antennæ: 21:12:13:13.

Intermediate legs: 47:34:12:20.

Posterior legs: 38:32:2:7.

General color brownish black, clothed with yellow pubescence. Pronotum with narrow transverse silver-gray band. Legs, sides of body, and two basal antennal segments with longer hairs and a few scattered setæ. Basal antennal segment swollen at a point two-thirds of its length and with three long setæ at this point. Pronotum broader than long (10:6), obtusely rounded behind and covering the mesonotum; metanotum emarginate behind. Coxæ, acetabula, anterior and posterior trochanters, base of anterior femur, and base of antennæ, flavous. Venter gray-black. Anterior trochanter and posterior tibia unarmed.

Apterous Male. Genital segments large, being as long as the last two abdominal segments. Posterior femur greatly incrassate, armed at the basal third with one long spine, at the middle with a longer spine, and this followed by seven shorter, stout spines; spines in two distinct rows. Last ventral segment of abdomen and first genital segment brown.

Apterous Female. Body cylindrical; connexivum nearly vertical, its edge with long hairs, and apex ending in a sharp, stout spine, extending back half

the length of the first genital segment. First and fourth abdominal segments gray, as are also the lateral margins of the second and third segments, and all dorsal abdominal sutures. Posterior femur strongly incrassate and armed much as the male. First genital segment on the ventral surface carinated and slightly depressed just beyond the base.

Length, 3.6-3.7 mm.; width, 1.2 mm.

Holotype, apterous male; allotype, apterous female; paratypes, apterous males and females; all collected by F. X. Williams, February 28, 1923, from Tena, Ecuador. Types are in the University of Kansas collection.

Comparative Notes. This species is similar to *R. amazonensis* n. sp., but differs in the large genital segments of the male, the size of the male claspers, and in the female the spine-like projections of the connexiva.

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EXPLANATION OF PLATES.

(51)

PLATE I.

THE GENITALIA OF RHAGOVELIA.

Semidiagrammatic drawings of the genitalia, illustrating the structures used in classification.

1. Claspers and internal genitalia removed from hypandrium and partially flattened.
2. Lever and penis removed from hypandrium in their natural position.
3. The genital segments.
4. The internal genitalia and hypandrium from above in natural position.

Structures: *lv*, lever; *mb*, membrane; *ps*, penis; *pr*, clasper; *pa* 1, appendage of penis 1; *pa* 2, appendage of penis 2; *an*, anal lid; *hy*, hypandrium; *x*, marking point of attachment of lever and clasper to hypandrium.

PLATE I.

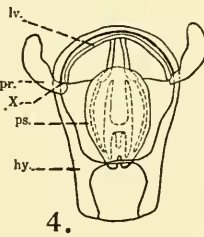
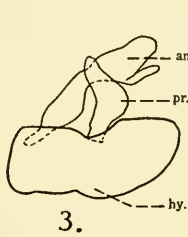
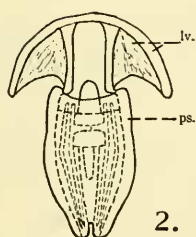
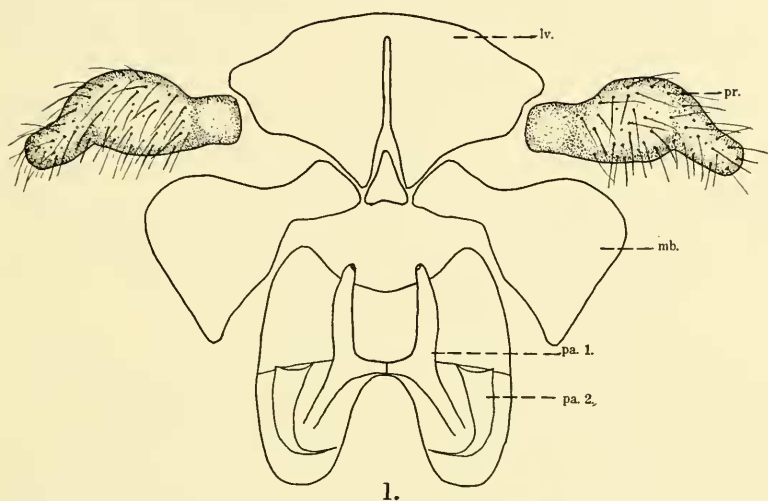
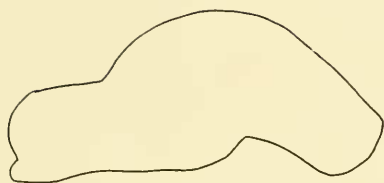
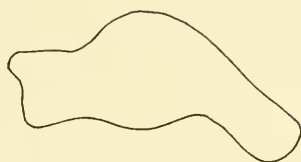


PLATE II.

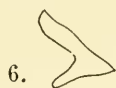
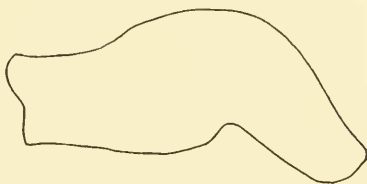
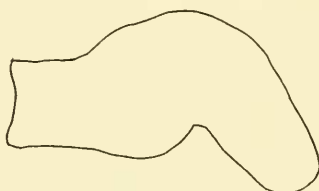
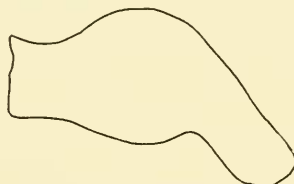
VARIETIES OF *Rhagovelia distincta* Champion.

1. Clasper of *cadyi* n. var.
2. Penis appendage 1. of variety *proxima* n. var.
3. Penis appendage 1. of variety *arizonensis* n. var.
4. Penis appendage 1. variety *valentina* n. var.
5. Clasper of variety *modesta* n. var.
6. Penis appendage 1. of variety *cadyi* n. var.
7. Penis appendage 1. of variety *modesta* n. var.
8. Penis appendage 1. of variety *harmonia* n. var.
9. Penis appendage 1. of *distincta* Champ.
10. Clasper of variety *harmonia* n. var.
11. Clasper of variety *proxima* n. var.
12. Clasper of variety of *excellentis* D. & H.
13. Clasper of variety *arizonensis* n. var.
14. Clasper of variety *valentina* n. var.

PLATE II.

1. *R. distincta cadyi*10. *R. distincta harmonia**R. distincta proxima*

2.

6. *R. distincta cadyi*11. *R. distincta proxima*3. *R. distincta arizonensis*7. *R. distincta modesta*12. *R. excellentis* (paratype)8. *R. distincta harmonia*4. *R. distincta valentina*9. *R. distincta*13. *R. distincta arizonensis*

5.

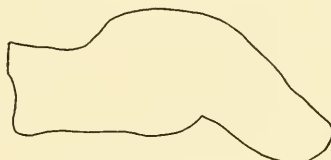
R. distincta modesta14. *R. distincta valentina*

PLATE III.

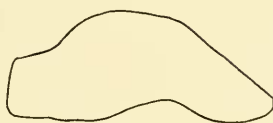
CLASPERS.

1. *Rhagovelia choreutes* Hussey.
2. *Rhagovelia robusta* n. sp.
3. *Rhagovelia arctoa* Bueno.
4. *Rhagovelia flavicincta* Bueno.
5. *Rhagovelia bcameri* n. sp.
6. *Rhagovelia oriander* Parshley.
7. *Rhagovelia castanea* n. sp.
8. *Rhagovelia lucida* n. sp.
9. *Rhagovelia obesa* Uhler.
10. *Rhagovelia rivale* Bueno.

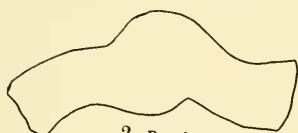
PLATE III.



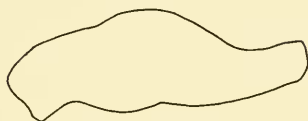
1. *R. choreutes*



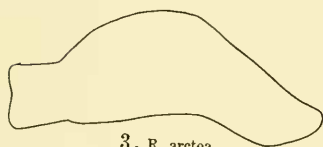
6. *R. oriander*



2. *R. robusta*



7. *R. castanea*



3. *R. aretoa*



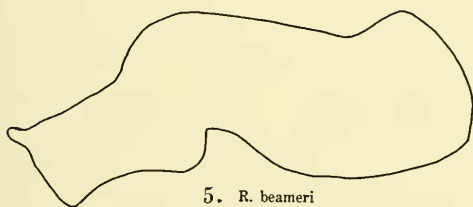
8. *R. lucida*



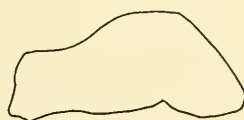
4. *R. flavicincta*



9. *R. obesa*



5. *R. beameri*



10. *R. rivale*

PLATE IV.

CLASPERS.

1. *Rhagovelia gigantea* Gould.
2. *Rhagovelia amazonensis* n. sp.
3. *Rhagovelia williamsi* n. sp.
4. *Rhagovelia relictæ* n. sp.
5. *Rhagovelia angustipes* Uhler.
6. *Rhagovelia obscura* n. sp.
7. *Rhagovelia longipes* n. sp.
8. *Rhagovelia confusa* n. sp.
9. *Rhagovelia sinuata* n. sp.
10. *Rhagovelia spinosa* n. sp.
11. *Rhagovelia trista* n. sp.
12. *Rhagovelia collaris* (Burm.).
13. *Rhagovelia insularis* Champion.

PLATE IV.

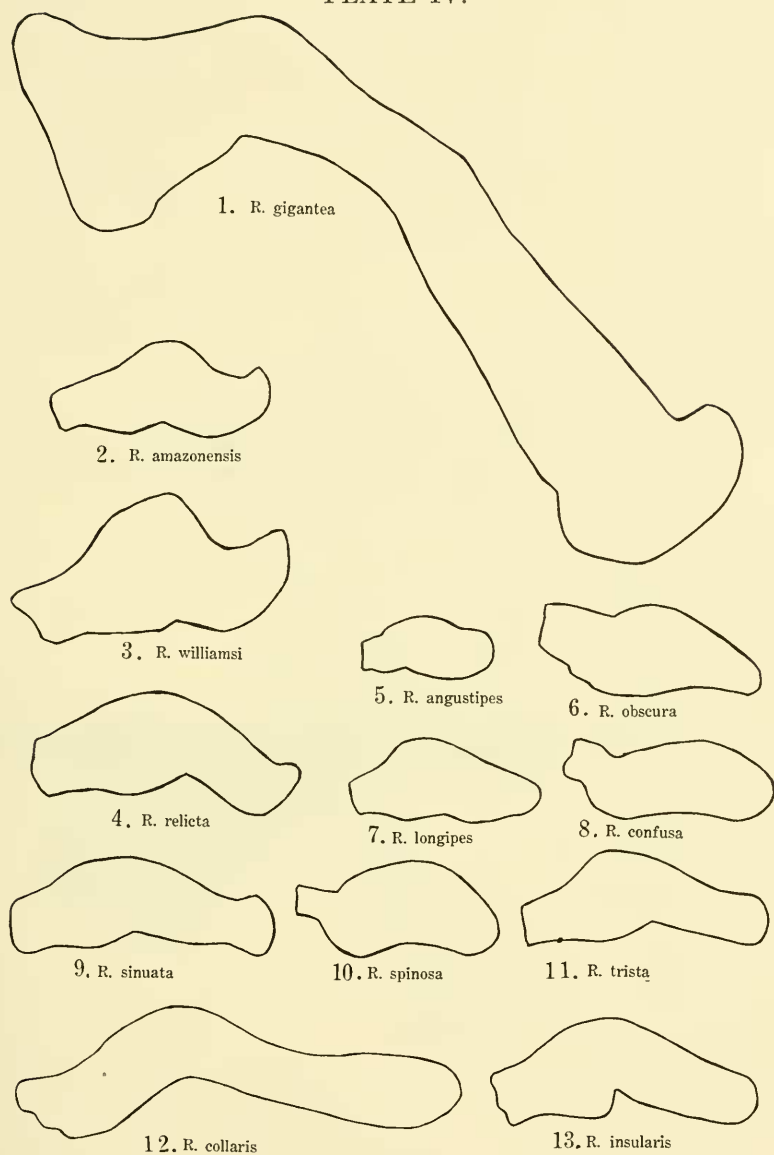
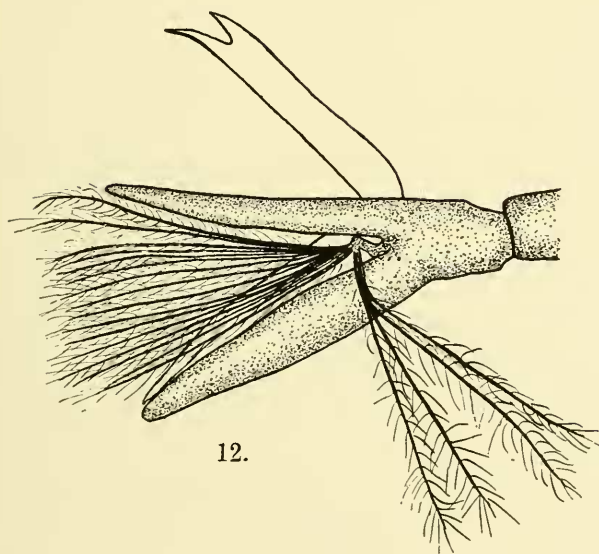


PLATE V.

STRUCTURAL CHARACTERS.

1. Penis appendage 1. of *Rhagovelia angustipes* Uhl.
2. Penis appendage 1. of *Rhagovelia spinosa* n. sp.
3. Penis appendage 1. of *Rhagovelia longipes* n. sp.
4. Penis appendage 1. of *Rhagovelia obscura* n. sp.
5. Pa 1. of *Rhagovelia confusa* n. sp.
6. Pa 1. of *Rhagovelia choreutes* Hussey.
7. Pa 1. of *Rhagovelia obesa* Uhler.
8. Pa 1. of *Rhagovelia rivale* Bueno.
9. Pa 1. of *Rhagovelia flavicincta* Bueno.
10. Pa 1. of *Rhagovelia oriander* Parshley.
11. Pa 1. of *Rhagovelia arctoa* Bueno.
12. Third tarsal segment of intermediate leg of a *Rhagovelia*, showing the characteristic cleft segment with the plumose hairs arising from the base of this cleft.

PLATE V.

1. *R. angustipes*2. *R. spinosa*3. *R. longipes*4. *R. obscura*5. *R. confusa*6. *R. choreutes*7. *R. obesa*8. *R. rivale*9. *R. flavicincta*10. *R. oriander*11. *R. arctoa*

12.